Vol. 6, No. 4 APRIL, 1931

First Copy

The FLEET OWNER

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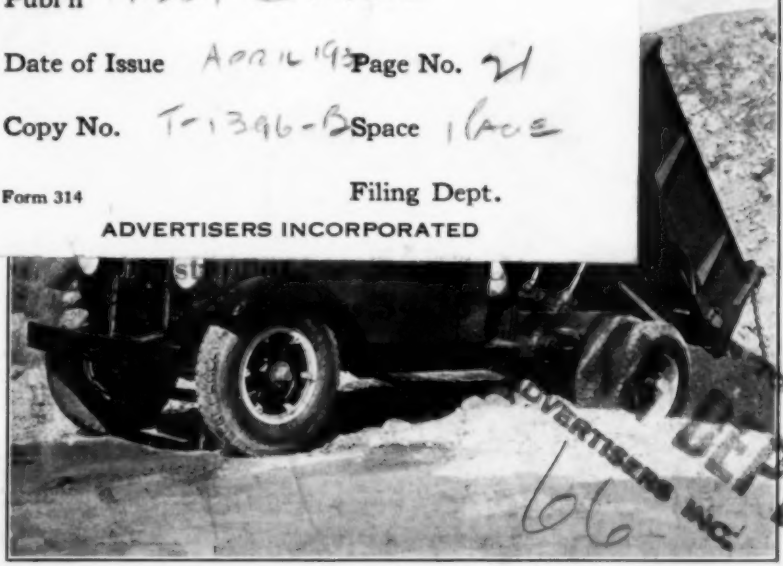

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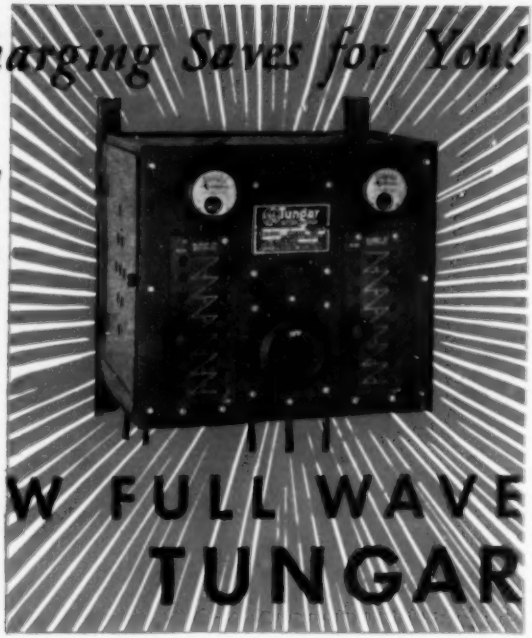
Quick Charging Saves for You!



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Suppose you could do all of your own fleet's battery charging on a *one-day* basis! *That* kind of swift service would be economical. Every battery ready right on time! Less money tied up in rentals!

You can have this economy with the *new* two-rate, two-bulb 12-Battery Tungar. It charges one to six batteries at the one-day rate . . . one to 12 batteries at the ordinary rate . . . or a combination at the same time.

That's flexibility! And you don't need to buy expensive equipment. This new Tungar will give you *any service you want* within its capacity.

CARE WILL SAVE YOUR CAR

There are Tungars in many sizes from one to 30-battery capacities. All of them are simple enough for anyone to operate. They are famed for reliability and freedom from trouble . . . world's best-known battery chargers. Write Section A-414 for full data.

GENERAL ELECTRIC

Automotive Products

MERCHANDISE DEPARTMENT · GENERAL ELECTRIC COMPANY · BRIDGEPORT, CONNECTICUT

SYMBOLS of a broader and stronger service—these signs are displayed by authorized Sales & Service Stations of the United American Bosch Corporation. They identify automotive products so long recognized for their dependability—products which are the result of the untiring efforts of two long-established manufacturers—Robert Bosch, A. G. of Stuttgart, Germany and American Bosch, Springfield, Mass.

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Super-Energy Magnetos Starting Motors Pyro-Action Spark Plugs
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Low Mileage Cost = PROFITS

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"For Those Who

The FLEET OWNER

Service Their Own"

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HENRY CLAY FISCHER
Editor

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NEW HOT SPOT GASKET

When Copper-Asbestos Gaskets Fail
Install Guaranteed Blowout-proof
FLEXIBLE METALLIC

ALUPAK GASKETS

We mean just that—blowout-proof, regardless of the unevenness of the surfaces, extreme heat or high pressure. "Alupak" Gaskets are cut from a patented pliable metallic material. Exposure to heat causes this material to swell and then harden. This swelling tightens the gasket against the walls with great force.

WILL EVEN HOLD ON WARPED SURFACE

saves expense of re-machining

Just as in the case of water, the flow of the swelling is in the line of least resistance. With a warped surface the swelling of the "Alupak" Gasket is greatest at that point where the flanges are widest apart. Thus "Alupak" Gaskets seal tightly even warped surfaces and saves the cost of resurfacing, amounting to from $7.00 to $15.00 per job.

TEST GASKET FREE

We are so certain of the efficiency of "Alupak" Gaskets that we invite you to challenge us with the worst gasket problem you experience. Send a sample of the gasket you are now using and letter of explanation. A test gasket will then be sent you without any obligation. Write today.

FELT PRODUCTS MFG., CO.

1511 CARROLL AVE. CHICAGO, ILLINOIS

Manufacturers of

"Felpro" Flexible Metallic Pump Packing in sets to fit exactly any car or truck

Gaskets, Washers, Strips, Channels, Pads cut from Cork, Felt, Paper, Karropak, Asbestopak, Grafel, Leather, etc.
Gasket Materials in Sheets and Rolls

Send for complete catalog and the address of the nearest Jobber.

The FLEET OWNER

"For Those Who Service Their Own"

PUBLISHED monthly in the interests of Automotive Fleet Owners who maintain their own Repair and Service Shops, and devoted to the better operation and maintenance of Trucks, Passenger Cars, Busses and Taxis.

HENRY CLAY FISCHER, Editor

Vol. 6 New York, April, 1931 No. 4

For Warmer-Weather Operation

SPRING is no longer "just around the corner." It's here! This is a good time to prepare every vehicle in the fleet for carefree, warmer-weather operation.

It should not be necessary to itemize the various routine operations that are seasonably necessary at this time of the year, as most operators adhere to thoughtfully prepared maintenance schedules.

However, there are a few things that *must* be done either this month or next. One of them has to do with the cooling system, which should be drained of anti-freeze mixtures, thoroughly flushed out, examined for leaks and defective hose, and given a general inspection.

Then there is the matter of wheel alignment. After subjecting your trucks and busses to the hazards of winter operation on rutty roads and skiddy pavements it goes without saying that good wheel alignment will have suffered somewhat. This is especially true since brakes have become almost universal on the front wheels, and as a consequence, front axles are now easier twisted through undue braking strains, etc.

Too much stress cannot be placed on seasonable tire inspection. It is claimed by many engineers that during the winter months

tires enjoy a sort of "winter protection" afforded by snow, slush and rain which act as a lubricant and prevent the "grindstone action" experienced on dry roads. The absence of excessive summer heat, detrimental to rubber of any kind, is also a factor. Inversely, frozen, rutty roads, which are fast disappearing, have been rather hard on tires.

Notwithstanding any "winter protection" tires should now be inspected for imbedded particles of glass, iron, nails or other foreign matter. Whenever a tire is off the rim, all patches in the tube should be carefully looked over, as loose ones are likely to be melted off when higher road speeds and warmer weather will be in order.

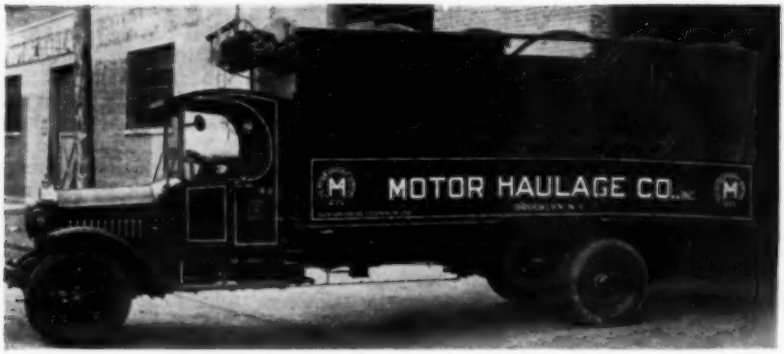
And now, from a standpoint of "appearance maintenance," it would also be well to touch up all rust-spots on bodies and fenders, and where tops are of the fabric variety, a good coat of top finish will go a long way in improving the appearance and protecting the material from deterioration and leaks. And so on, *ad infinitum*. You know just exactly what is to be done from your past experience. The time for doing it is here.

Standardizing Model Announcements

THE recent resolution of the National Automobile Chamber of Commerce, suggesting that all new models of cars be presented *simultaneously*, preferably in November and (or) December is of more than passing interest to the fleet operator, because of the thousands of passenger cars that are operated in fleets.

This latest step towards standardization will mean much in the way of simplicity, especially to the maintenance department, inasmuch as it will facilitate the ordering of replacement parts especially where parts are carried in stock to any extent. It should also simplify matters when parts are ordered by telephone, or sight unseen. Under the old system, where two or more different models of the same car were introduced at different periods of the same year, with major differences in the specifications, much question sometimes arose as to what year the car really was. This latest move should do much towards keeping down maintenance costs.

The Editor



Servicing a Heavy-Duty Fleet

How Our Fleet of 250 Trucks and Semi-Trailers Is Efficiently Operated and Maintained

By C. S. Lyon*

WE operate and maintain a fleet of approximately two hundred and fifty vehicles within the greater Metropolitan area of the City of New York.

At the present writing our fleet consists of Packards, Macks, Pierce-Arrows and Lapeer and Fruehauf semi-trailers, with approximately ten per cent of our entire fleet being vehicles of miscellaneous makes. The reason for our "miscellaneous" fleet is that we always try to ascertain for ourselves the relative economies of the various makes of units. At present our "miscellaneous" fleet contains such makes as International Harvesters, Relays, Dodges, Ford tractors, etc.

Eighty per cent of our service is confined to heavy-duty haulage, as "Haulage' is our "middle name." Of the equipment that is now in our service, we are inclined to favor the tractor and semi-trailer as an integral unit, in lieu of four-wheel trucks and multiple-wheel single chassis units as this type of equipment lends itself more readily to heavy-duty service, due to its flexibility and roadability. Then, too, as the motive unit requires more shop attention than the trailer unit, considerable savings may be enjoyed by having a minimum amount of space set aside for the servicing of the tractors only, than with corresponding long wheelbase trucks.

In our opinion, automotive equipment should be stored in heated garages during the winter

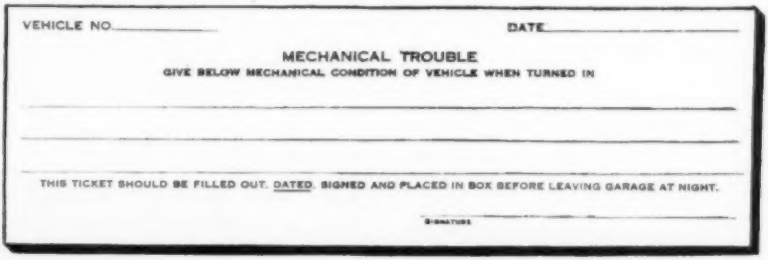
* *Vice President, Motor Haulage Company, Inc., Brooklyn, N. Y.*

months. This facilitates starting and eliminates many of the other evils directly caused by storing vehicles in unheated garages. The heating of garages, alone, is a rather expensive item, which costs approximately ten cents per square foot, per heating season, according to our experiences. When operating integral units, as we do, the tractor, or motive power unit can be disconnected and stored in a much smaller space than a corresponding "solid" unit, or long wheelbase truck. The semi-trailers can be stored in unheated garages, or even in the open, where necessity compels so doing. Thus the heating cost can be kept down to a minimum, as the power units can be bunched together in much less floor space, than if straight heavy-duty trucks were operated.

Another reason why we favor the integral unit, or tractor-semi-trailer equipment is from the standpoint of rendering the best service, at the lowest cost to our customers. Major breakdowns, while infrequent, will and do occur, such as the breaking of axles, shafts, transmissions, clutches, etc. In many instances where such physical breakdowns occur, it requires us to either transfer the load to another vehicle or to tow the disabled vehicle to its destination. Transferring of the load is not only costly, but it requires time, in some instances as much as two hours for a complete transfer. The majority of such breakdowns occur, of course, on the motive unit, and in our operation, to expedite matters we send a spare tractor to pick up the loaded semi-trailer and tow it to its destination. This is considerably easier than transferring the load to another vehicle, which would have to be done if the breakdown occurred on a straight heavy-duty truck. The disabled motive unit can be then picked up and towed back to the shop at our own convenience.

Major breakdowns, of course, will happen to the best of equipment. However, we try to minimize *minor* breakdowns, such as clogged gasoline lines, faulty ignition points, fouled spark plugs, etc., and leaving this subject we will turn to some of the routine employed in getting the best performance out of our vehicles—the subject of maintenance.

In addition to the regular driver's daily report of work done, all drivers are required to fill out a mechanical report, which is perforated and attached to the daily report. Both sides of this report



VEHICLE NO._____ DATE_____

MECHANICAL TROUBLE

GIVE BELOW MECHANICAL CONDITION OF VEHICLE WHEN TURNED IN

_____

_____

_____

THIS TICKET SHOULD BE FILLED OUT, DATED, SIGNED AND PLACED IN BOX BEFORE LEAVING GARAGE AT NIGHT.

SIGNATURE _____

THE SENSATION OF THE TRUCK INDUSTRY

THE NEW Stewart 8

50 to 60 miles per hour with load

3½ Tonner
$3990 chassis

Wheelbases

160″, 170″, 196″, 226″ and 241″

Still another Stewart triumph! This time an "8" developing 130 horsepower, capable of 50 to 60 miles an hour. A marvel of power and speed for long, fast hauls. The new Stewart "8" is rugged, powerful, yet smooth and vibrationless. Its heavy duty motor is designed for gruelling work. No road is too rough, no job too tough for this "8". From radiator to tail light, it's an honestly rated truck built by exclusive truck makers. The new Stewart 3½ tonner, like all Stewart models, is built to give years of constant service.

If your demands include long, fast hauls at low operating cost, get "America's Greatest Truck Value" on the job. Let Stewart performance prove Stewart claims. A ride behind the wheel of this new Stewart "8" will amaze you.

Free catalog sent upon request.

16 Models

1 to 7 Ton

76 Wheelbases

$695

to

$5700

Stewart MOTOR TRUCKS

STEWART MOTOR CORPORATION

Buffalo, N. Y.

Cables: Stewartruk Buffalo
Codes: Acme, Bentley.

Brief Specifications

8 Cylinder Motor

3¾″ bore, 4¾″ stroke.

Horsepower 130.

12 Speed Transmission, 9″ Frame, Double Reduction Rear Axle, Worm optional, Booster Brakes, 9.00-20 Balloon Tires, duals rear.

Full detailed information gladly sent on request.

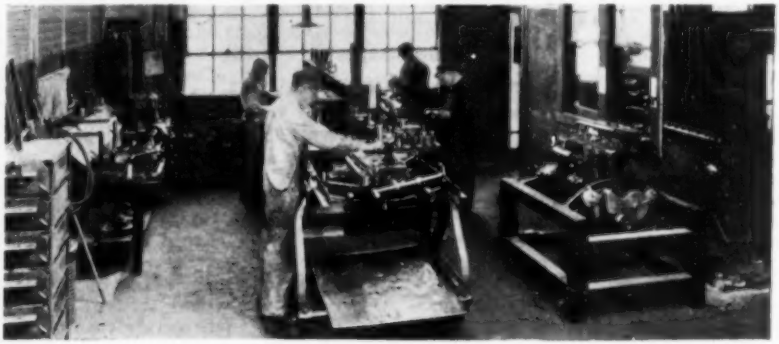
Stewart Trucks have won—By costing less to run

are shown accompanying this article. This report must state whether or not there is any complaint insofar as the mechanical operation and condition of his vehicle is concerned. Such reports are signed by the driver, giving the location of the garage (we have several) in which his vehicle is stored. Minor complaints, such as "motor lacks power," "motor spits," etc., are serviced by the night force. However, if in the opinion of the night inspector, such repairs cannot be readily made, that vehicle is held in for transfer to the general shop, and another vehicle is assigned in its place.

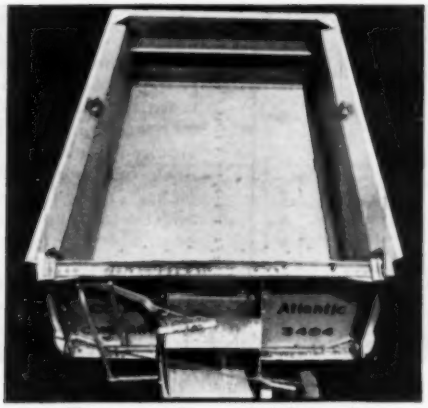
In the servicing of our units we have a night crew to eliminate night breakdowns and road inconveniences. This crew comes on at six o'clock and works clear through until eight in the morning, thus overlapping the period that the day force covers.

For simplifying mechanical operation, our general fleet is divided into sub-fleets consisting of twenty to thirty-five units of various makes and each is placed in charge of a fleet inspector, with an assistant. The average fleet is so worked out that the mileage of one fleet versus that of another fleet will be approximately the same. This eliminates the possibility of one fleet inspector having more work to perform than a corresponding fleet inspector, whose mileage may be lower.

Such vehicles assigned to fleets are brought in for inspection every one-thousand to fifteen-hundred miles, depending upon the class of service they perform. Vehicles designated for inspection are thoroughly washed the night before. Road servicing of these vehicles is taken care of by the personnel of the fleet to which the truck is assigned. There are some types of road failures that we do not look favorably upon, particularly those mentioned previously, and classed as "minor" breakdowns. We believe that there should be no excuse for such road delays and each



Rebuilding truck engines in the general repair shop. Note the husky engine stands, line-boring machine and other equipment



This is an actual unretouched photograph

4000 5-Ton loads hauled
and scarcely a dent to show for it

How do Alcoa Aluminum truck bodies stand up? Here is the answer.

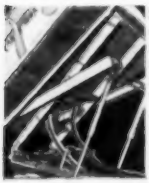
This body was built of the strong alloys of Alcoa Aluminum for the Pittsburgh Coal Company in 1928. It is loaded by gravity, a 6-foot drop directly into the body. After hauling 4000 five-ton loads, the body, as the unretouched photograph shows, has scarcely a dent in its floor.

Mr. J. F. Flood, manager of the company says, "The bottom has not shown any greater wear than steel would under the same conditions; in fact it is more resilient than steel and the bottom of the Aluminum body does not show any waves between structural parts."

No wonder this company already has 18 trucks in service equipped with Alcoa Aluminum bodies and several more at present in the course of construction.

For the fabrication of truck bodies, standard structural shapes and sheets of the strong alloys of Alcoa Aluminum, equivalent in strength to structural steel but only 1/3 as heavy, are carried in stock. Strong alloy plates, rivets, bolts and screws for use with these are also available.

Write for the booklet on Alcoa Aluminum for truck bodies. It shows details of construction. Address ALUMINUM COMPANY of AMERICA; 2461 Oliver Building, PITTSBURGH, PENNSYLVANIA.

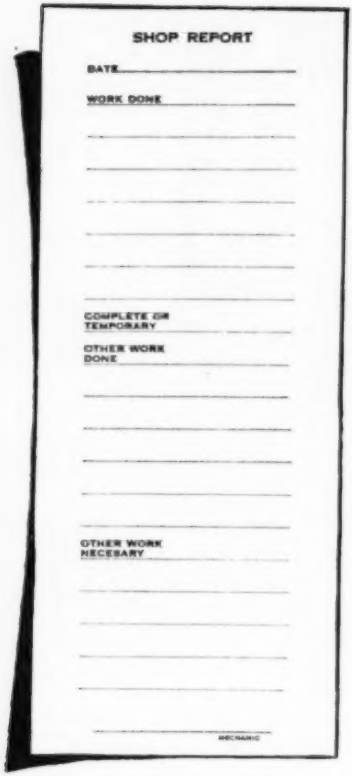


Shows the longitudinals and cross-members. The cross-members are 4 in. Alcoa Aluminum alloy I-beams, spaced 2 ft. 2½ in. on centers, and the longitudinals, 5 in. Alcoa Aluminum alloy I-beams.

ALCOA

Gives you an idea of the manner in which this truck is loaded. The coal is dropped into the body by gravity from overhead bins. The average drop is 6 feet.

ALCOA ALUMINUM



SHOP REPORT

DATE

WORK DONE

COMPLETE OR TEMPORARY

OTHER WORK DONE

OTHER WORK NECESSARY

MECHANIC

This report appears on the reverse side of the drivers' report, shown on page 10.

fleet inspector is held strictly accountable, as his particular vehicles should have been properly gone over at the time of inspection.

Major repairs are done in our general repair shop. Such repairs are done on a "spare-unit" basis. In addition to our inventory of spare engines, transmissions, rear axles, wheels, steering columns, etc., we carry in stock some 3,600 items, amounting in value to about $20,000 worth. At one time we were carrying approximately $65,000 worth of stock—quite a large stock to maintain such a small fleet, but due to the increased efficiency and the establishment of additional service stations, we have been able to materially reduce this stock inventory of replacement parts and supplies. We recall, but a few years ago, when it was very difficult at times to secure parts from local service stations covering their trucks, and as a protection against such instances, it was necessary for us to carry in stock many of these parts. Now we do not have much difficulty, particularly since the advent of the automotive jobber, from whom some purchases are made.

On page 15 is illustrated a Motor Vehicle Service Inspection Report that we formerly used in connection with our maintenance. We have of late discontinued this form, the objection we found to it being the amount of time required to fill it out properly and also on account of the fact that all of our vehicles come in to the repair base for inspection, and such inspection can be well supervised without a detailed report of this kind.

The report itself, however, is an excellent one to be used where inspections are made on the road, or in other words, where fleets are operated from a sub-base and do not come into the repair base for inspection. In studying this report form, the reader will note that there are four columns marked OK, AG, AR and SN. Checks in each respective column would indicate the following: OK meaning

MOTOR VEHICLE SERVICE INSPECTION REPORT

Vehicle No._____ **Make**_____ **Model**_____ **Date**_____

Inspector_____ **Mileage Reading**_____

	OK	AG	AR	SN
LUBRICATION:				
Grease Cups Missing				
Gauge working Properly				
BRAKES:				
Foot Brake—Lining				
Do They HOLD?				
Adjustments				
Hand Brake—Lining				
Do They HOLD?				
Adjustments				
MOTOR:				
Compression—Good—Fair				
Bad Cyl. Nos.				
Carbon & Valves				
Has it NORMAL POWER?				
Connecting Rod Bearings				
Main Bearings				
Push Rod Adjustment				
*Governor & Seals				
Motor Noisy				
Timing Gears Noisy				
*Cylinder Head Tight				
*Cylinder Base Nuts				
*Crank Case Base Bolts				
Motor Supports				
Front				
Rear				
*Fan Belt Tight				
*Fan Belt Condition				
*Bearings Lubricated				
*Oil—Level				
Oil Leaks				
Oil Pump				
RADIATOR:				
*Is it Full?				
*Is it Clean?				
Does it Leak?				
*Water Connections				
*Suppports				
FUEL SYSTEM:				
Carburetor				
Throttle Adjustment				
*Drained				
*Leak				
*Gas Line Leaks				

	OK	AG	AR	SN
Gas Tank				
Air Lines				
CLUTCH:				
*Clutch Action				
Clutch Pedal Adjustment				
Clutch Adjustment				
Clutch Drags				
TRANS. & DIFFERENTIAL:				
*Oil Level Change 6 Mo.				
*Oil Leaks				
Shifting Levers				
Gears Noisy				
*Case Bolts				
Sprockets (Jackshaft)				
*Driving Chains				
UNIVERSAL JOINTS:				
Condition				
*Grease				
*Housing				
*Drive Shaft—Center Bearing				
REAR AXLE & DIFFER.				
Worm Thrust Adjustment				
*Oil Leak				
*Oil Level Change 6 Mo.				
Condition of Housing				
Truss Rod				
Torque Arm & Radius Rods				
Bearings				
Wheel Adjustment				
Sprockets (Brake-Drum)				
FRONT AXLE & STEERING:				
*Steering Action				
Steering Connections				
*Steering Arm Tight on Square				
Knuckles, Pins & Bushings				
Wheels—Adjustment				
Alignment				
*Back Lash				
Controls—Gas				
Spark				
Choke				

	OK	AG	AR	SN
ELECTRICAL SYSTEM:				
Magneto & Connections				
Breaker Points				
*Battery & Connections				
*Distilled Water Level				
Generator & Regulator				
Switches				
*Lights				
*Fuses				
*Horn				
Wiring				
Timing				
Distributor Brushes				
*Spark Plugs				
RUNNING GEAR:				
Frame, Brackets & Hangers				
Fenders				
Bolts & Bushings				
SPRINGS—FRONT & REAR:				
*Condition				
*Front				
*Rear				
*Clips—Have you tightened?				
*Shackles—Grease				
BODY:				
Sills				
Cab				
*Is it Loose?				
*Cushions				
Wind-shield				
Upholstery				
Paint				
TIRES:				
Solid				
*Condition				
Chain-hooks				
EQUIPMENT:				
*Speedometer				
*Mirrorscope				
*Curtains				
*Skid Chains				
Tarpaulin				
Bows				

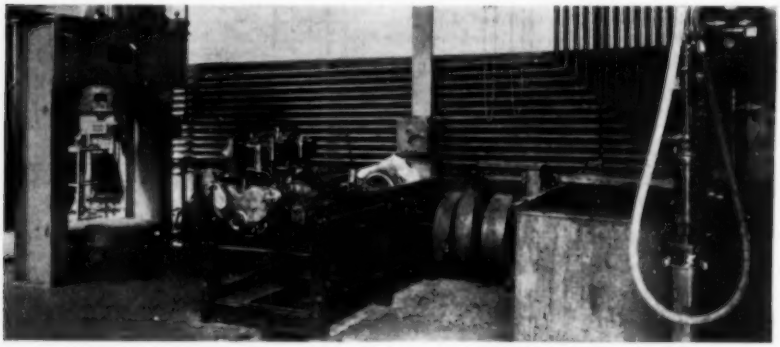
See page 14 for detailed description of this report.

inspected and found to be correct; AG meaning inspected and found necessary to give attention; AR meaning inspected and found attention required, but could not be taken care of at the time; SN meaning inspected and found to be neglected either on the part of the driver or the previous inspection made by the inspector.

This form is now supplemented by a Shop Repair Order (not illustrated) on which is noted the number of the truck; number of job, make, model and type of vehicle; date the work is to be finished; date done; mechanic doing it; and time taken to do it. In the event that additional work is found to be required, while performing the scheduled work, the foreman notes the same on the Shop Order and it is done at the same time.

Crankcase oil is changed at the time the vehicle is brought in for inspection, provided it has been used over a period of sufficient mileage. On class A vehicles, oil is changed at 2,500 miles; class B, 1,500 miles; and class C vehicles 500 miles. Class C vehicles include those that are rapidly approaching a state of obsolescence and are such vehicles that we contemplate disposing of within a very short time. Due to the low daily mileage of our vehicles, the state of obsolescense to us is considered more from a roadability standpoint than from a mechanical standpoint. Some of the vehicles in our fleet are ten years old and, even today, are able to perform mechanically to within eighty per cent of their performance when new. However, from a roadability standpoint these vehicles are now obsolete, due to the demand for greater flexibility and because of the advent of multiple-cylindered engines, pneumatic tires, over-drive transmissions and finer coordinated units. Such vehicles are used merely as spare units.

Our units average 50 miles per quart of oil rather consistently, and a lot of our engine repair work is determined on the engine's oil-



A corner of the general repair shop. Note the engine running-in stand, which was made from an old electric motor and a discarded transmission.

Fitting Your Business— Fitting Your Pocketbook

Reo fits your haulage requirements by constantly introducing new ideas in bodies. ¶ Reo fits your pocketbook with economies resulting from its quick acceleration and deceleration in traffic—with further economies resulting from its all-day, all-year, long-life stamina. ¶ Carefully engineered, with friction and vibration reduced — made of finer metals, and the chassis balanced and free of excess dead weight, Reo is needed in your business for the most profitable haulage.

REO MOTOR CAR COMPANY, LANSING, MICH.

SPEED WAGONS REO AND TRUCKS

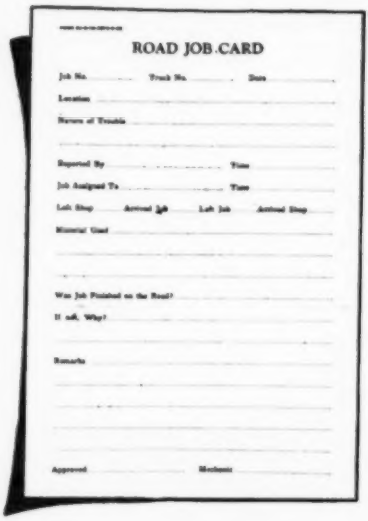
Motor Haulage's Fleet

(Continued from page 16)

consuming tendencies. In fact, we sometimes use the oil consumption record as a measuring stick for many of our major overhauls.

No article on fleet maintenance is complete without its cost figures. Actual cost figures are always interesting. The following few figures give the actual costs covering four-wheel, heavy-duty units, versus the tractor-semi-trailer units, over a period of 48,000 miles. In comparing these figures, we refer to "heavy-duty" as four-wheel units, and tractor-and-semi-trailer units as "integral" units consisting of tractor and semi-trailer.

The fuel cost on the heavy-duty units over this 48,000 mile period was .0579 cents per mile. On the tractor and semi-trailer units it was .0599 cents per mile. The fuel cost, on the latter, is of course higher, but it is known that the integral units of the present design are approximately 2,000 pounds heavier than the corresponding four-wheel units.



ROAD JOB CARD

Job No. ..... Truck No. ..... Date .....

Location .....

Nature of Trouble .....

.....

Reported By ..... Time .....

Job Assigned To ..... Time .....

Left Shop ..... Arrived Job ..... Left Job ..... Arrived Shop .....

Material Used .....

.....

.....

Was Job Finished on the Road? .....

If not, Why? .....

.....

Remarks .....

.....

.....

.....

.....

Approved ..... Mechanic .....

On these units we average approximately 2.25 miles per gallon for city work, and approximately 3.75 miles per gallon for country work. This low mileage in city work is due, of course, to the excessive use of the transmission on account of traffic congestion, and the lack of realization on the part of the drivers, that motors running idle consume fuel.

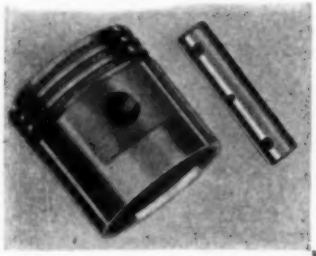
The lubricating cost on the heavy-duty units was .0030 cent per mile as against .0035 cent per mile on the integral units.

Tire costs average .0151 cents per mile on the heavy-duty units, as against .01 cent per mile on the integral units. The latter, of course, includes ten tires per unit. Both units carry approximately the same tonnage and there is a considerable difference in the load per inch of tire.

The mechanical costs consist of labor, outside repairs and parts and materials. On the heavy-duty units, this amounted to .0515 cents per mile, as against .0423 cents per mile on the integral units. It is interesting to note that in both instances the fuel cost more than the mechanical repairs.

Inspection of the heavy-duty units cost .0149 cents per mile, as against .0120 cents per mile on the integral units.

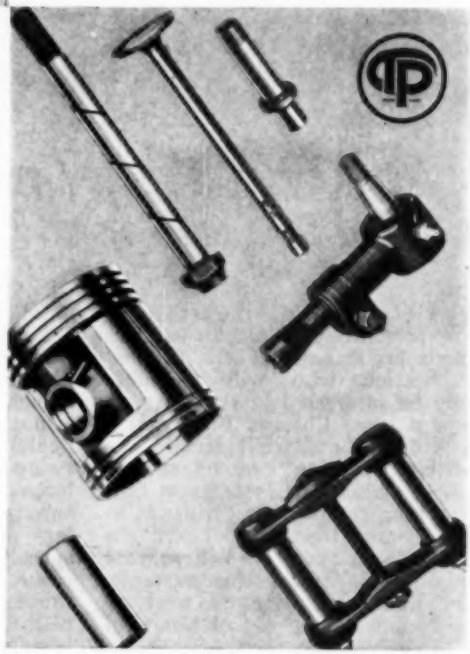
The foregoing figures are actual "out-of-pocket" expenses, and do not include fixed overhead.



a Word TO THE WISE.

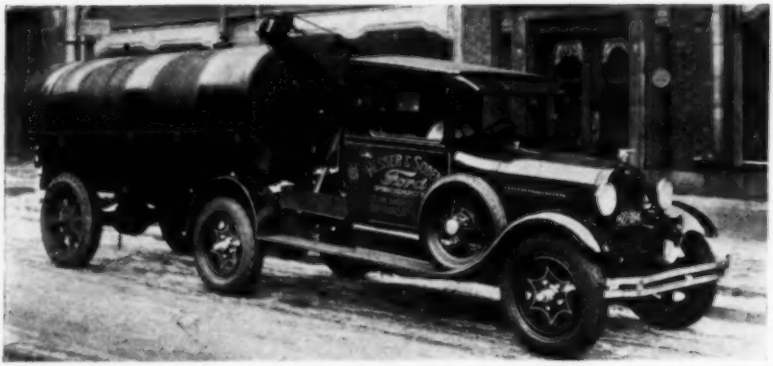
Honestly, now, don't you always have an uncomfortable suspicion that you're inviting trouble when you put old, patched-up parts back into a repair job? A limping engine will keep your gas and oil bills high. And repeated overhauls will cost more in the end than a few new replacement parts. Figure it on a mileage basis, and replace with Thompson Products.

THOMPSON PRODUCTS, INCORPORATED
General Offices:
Cleveland, Ohio, U. S. A.
Factories: Cleveland and Detroit



Thompson Products

Thompson Valves and Guides; King, Shackle, Tie Rod Bolts and Bushings; Eccentric Tie Rods; Pistons and Pins; Tryon Shackles.



Making *the* Wrecker *Pay*

How One Firm Made Its Wrecking Car Do Triple Duty and Transformed It Into an Asset

ALTHOUGH not the actual experience of a fleet operator, there are many readers of this publication who will undoubtedly be interested in the story of how a large Chicago Ford dealer gets double and triple service out of his wrecking car, or service truck, making his investment in a wrecking car pay big dividends in more ways than one. There are many fleet owners, we believe, that might well follow this example, and find sufficient extra work to make a wrecking car of this kind a profitable investment.

From the illustrations accompanying this article, the reader will note that instead of devoting the truck exclusively to towing in disabled vehicles, this truck has been arranged for accommodating trailers, and can hook on a large flat-bed trailer for delivery work, or a large tank trailer for carrying gasoline, oil and lubricants.

To make this arrangement practical, it was necessary to use a derrick which takes up little room in the truck, when it (the derrick) is not in actual service. The particular derrick chosen has a circle swing boom that can be turned and locked at the side, and a small supporting base which takes up less than a square yard of floor space. It was chosen primarily because it permitted the addition of the coupling platform at the rear of the truck chassis. The platform is not in the way when the truck is used for wrecking or towing purposes, and in only a moment's time either of the trailers mentioned can be readily hooked up.

When not on service jobs, the truck is coupled to the trailer tank and used for carrying fuel oil, gasoline and lubricants for the garage. In this manner it has been

HUNDREDS IN YOUR INDUSTRY HAVE PROVED THE VALUE OF THESE *HEAVY-DUTY* TRUCKS

There is no guess, no experiment on the part of those who select Dodge Heavy-Duty Trucks. Business men in your industry and many others have proved conclusively the sound value of these sturdy, modern workers. » » Dodge Heavy-Duty Trucks are available in an unusually wide variety — with payload capacities as great as 11,175 pounds. Inspection—part by part—proves that they are *all truck*—that they are ruggedly built of precision parts. And that all parts are correctly proportioned, one to the other, to insure long, dependable service at low cost. » » No matter how heavy your loads may be, there is a Dodge Heavy-Duty Truck that will fit your needs. So see your Dodge Brothers dealer. See, inspect and test these exceptional trucks. You can buy one complete with standard or special body—at a price you will say is low.

THE COMPLETE LINE OF DODGE TRUCKS RANGES IN PAYLOAD CAPACITIES FROM 1,200 TO 11,175 POUNDS—PRICED CHASSIS F. O. B. DETROIT, FROM $435 TO $2695, INCLUDING THE 1½-TON CHASSIS AT $595

DEPENDABLE

DODGE HEAVY DUTY TRUCKS

possible to make bulk purchases directly from tank cars on nearby railway sidings at attractive prices, and deliver them directly to the garage's own storage tanks. The company operating this unit estimates that the additional savings made on these purchases have gone a long way towards paying for the service truck and its equipment.

Again, repair and replacement parts, equipment and supplies for the shop are speedily brought in when required, by using the large flat-bed trailer, resulting in prompter acquisition of the needed stock and a saving in delivery charges.

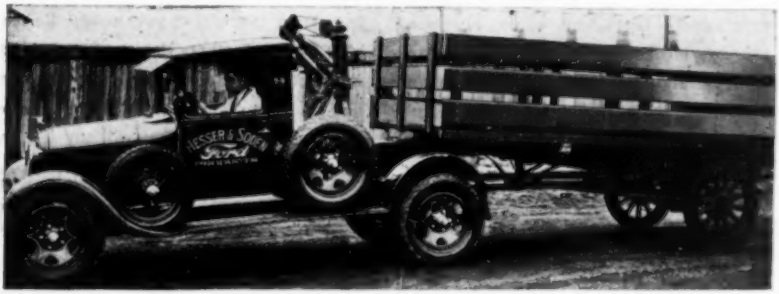
As a wrecking car, this unique truck has seen much service, bringing in as many as 48 jobs a day in bad weather, many of which required overhauling and repairing, and this business, as well as the towing, would have been lost without the service truck. Before acquiring the truck, it is stated, regular customers of the dealer had been forced to call on motor clubs or other service stations for the towing, and these competitors sometimes got the service business, as well.

The service truck has brought other business to the shop. Among other things, it gets practically all the towing work of a large Chicago automobile credit company. Furthermore, it is a constant advertisement; the truck is a good-looking job and is always kept in top condition. As the company name, address and telephone number are easily seen, it has actually brought in much new business.

While this story relates the experiences of a truck dealer, there are many fleet owners who will be interested in learning how the problem of a necessary service truck can be solved, without what at first seems to be a prohibitive cost. "Our truck has both saved and made money for us," says the service shop manager, "we simply cannot get along without it."

Of course the "profit" part of this story is entirely irrelevant to the problems of fleet operation, where "profit" from service work does not belong in the picture.

(Please turn to page 65)



Either the flat-bed trailer (above) or the tank unit, shown on page 20, can be hooked up to this triple-duty wrecker

What Is Viscosity

. . . and why measure it?

THE purpose of motor oil is to safeguard the working parts against dangerous friction and wear by means of an oil-film between all sliding surfaces. This protective film prevents metal-to-metal contact. But it is effective only so long as the lubricant possesses enough viscosity (or body) to resist being squeezed out.

The instant viscosity breaks down (because of crankcase dilution, overheating or some other factor) dangerous friction starts. Motor efficiency slumps. Power is wasted.

VISCO-METER warns against this common disorder. By means of an easy-to-read dial on the dash, Visco-Meter indicates continuously, while the motor is running, the exact lubricating value (i. e. viscosity) of the oil. The driver is notified at all times whether or not the motor is being protected.

Correct lubrication is simple and carefree this new way. And the motor responds with smoother operation, reduced power losses, less carbon and longer life.

Visco-Meter Multiplies Savings!

The Visco-Meter-equipped fleet shows worthwhile savings both in operating and in maintenance costs. Correct lubrication means a better oil seal in the cylinders, and consequently a greater gasoline mileage on each truck. Visco-Meter also enables you to get every possible mile of wear *safely* out of every barrel of oil.

Your copy of this useful booklet on up-to-date lubrication "A Practical Test for Viscosity" is now ready. Send for it today . . . Visco-Meter Corp., 318 Grote Street, Buffalo, N. Y., or 6-247 General Motors Bldg., Detroit, Mich.

The VISCO METER

Takes the Guesswork out of Motor Lubrication

How to Service

Hydraulic Brakes

Diagnosing Troubles and Making Repairs

IN January we offered to the fleet maintenance man a factory-prepared article describing the Hydraulic Brake and outlining the general maintenance procedure in properly caring for this type of braking system.

This month we continue this general service article, with a complete set of maintenance hints, compiled especially for readers of this publication by the Wagner Electric Company, St. Louis, Mo., national service organization for the Lockheed Hydraulic Brake.

With the following information on hand for ready reference, the fleet mechanic should be able to quickly diagnose and correct all brake complaints on this type of brake that may come into the shop.

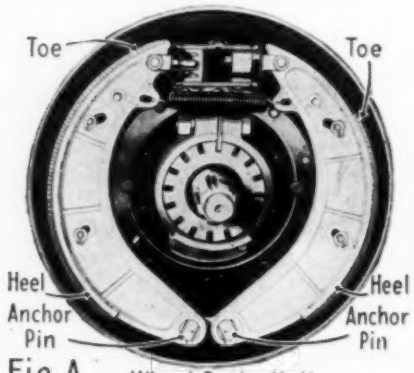


Fig. A Wheel Brake Unit

Here are the various causes of trouble, and their respective remedies:

Number 1—Pedal Goes to Floorboard: The causes of this condition are enumerated below, in six sections—

a—Normal wear of lining.
b—Brake shoes improperly adjusted.
c—Leak in hydraulic system.
d—Air in hydraulic system.
e—Pedal improperly set.
f—No fluid in supply tank.

The respective remedies are given below, with the corresponding letters alongside of each:

a—When brake linings become worn it is necessary to set the shoes into closer relation to brake drums. This condition is usually accompanied by the remark that it is necessary to *pump* the pedal several times before a brake is obtained. Shoes should be set as close to brake drum as possible without drag. Do not disturb anchor pins in making this adjustment. Adjustment must be made while drums are cool.

b—In cases where the eccentric anchor pins have been disturbed and the relation of the arc of the shoes to drums changed, so the heel or lower lined section of shoe is engaging the drum while the toe or upper section of shoe remains out of contact, a tendency to spring the shoes and distort

for Complete Brake Service

Typical Wagner Service Branch where the latest machinery and methods are used for complete brake service

More and More Operators Are Turning to Wagner

Complete Brake Service

For trucks, buses, tractors and trailers can be had at these 25 Wagner Service Branches

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Baltimore, Md.....2316 N. Charles St.
Boston, Mass.....8 St. Mary's Street
Buffalo, N. Y.....1796 Main St.
Chicago, Ill.....1935 S. Indiana Ave.
Cincinnati, Ohio....2125-27 Reading Road
Cleveland, Ohio.....3756 Carnegie Ave.
Dallas, Texas.....408 to 410 N. Pearl St.
Denver, Colo.....1360 Bannock St.
Detroit, Mich.....2843 E. Grand Blvd.
Indianapolis, Ind....1032 N. Illinois St.
Kansas City, Mo....1615 Baltimore Ave.
Los Angeles, Calif...1220 S. Hope St.
Memphis, Tenn.....1114-16 Union Ave.
Milwaukee, Wisc....925-927 N. Broadway
Minneapolis, Minn..1225-31 LaSalle Ave.
New York, N. Y....503-507 West 56th St.
Omaha, Nebr.....2038 Harney St.
Philadelphia, Pa.....1720-26 Callowhill
Pittsburgh, Pa.....5031 Liberty Ave.
Portland, Ore.....14th and Couch St.
San Francisco, Calif..457 Ninth St.
Seattle, Wash.....1918 1st Ave., South
Saint Louis, Mo.....3029 Locust St.
Toronto, Canada....217 Dundas St. East

Wagner maintains in the 25 largest cities a service unparalleled » » » a complete brake service making it possible for operators to maintain efficient brakes from a central service source.

Thus one organization—Wagner—can be entrusted with the entire braking system, a service which saves operators time and money.

Operators maintaining their own service departments are at all times welcome to consult Wagner on braking problems.

Wagner Brake Service

Wagner Electric Corporation, St. Louis, Mo.

Manufacturers of and Exclusive National Service Organization for

LOCKHEED HYDRAULIC FOUR-WHEEL BRAKES

drums will result and the pedal movement necessary will allow pedal to go to floorboard. Shoes should be readjusted with the aid of a ring gauge.

c—A leak in the system will allow the pedal, under pressure, to go to the toe board gradually. If no leaks are found at wheels or joints, remove master cylinder and check bore of barrel for score or scratches.

d—Air in the system will cause a springy, rubbery action of the pedal. Should a sufficient quantity be introduced into the system, the pedal will go to toe board under normal pressure. System should be bled.

e—Brake pedals should be set with approximately ½ inch free motion before the pressure stroke starts. Additional free motion reduces the active travel of the master cylinder piston, which in turn determines the amount of working fluid to be expelled from the master cylinder into the lines or system.

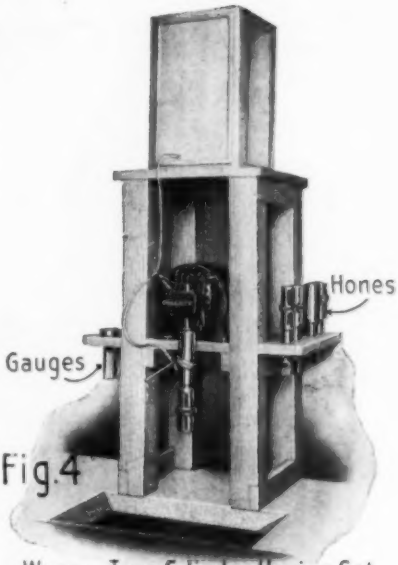
f—The fluid level in the supply tank should be checked at regular intervals. Should the tank become empty, air will be introduced into the system, necessitating bleeding.

Number 2—All Brakes Drag: The causes for this condition are listed below, in two probable conditions—

a—Mineral oil in system.
b—Pedal improperly set.

The respective remedies for both of these conditions are given below, with the corresponding letters alongside of each:

a—The introduction of mineral oil, such as engine oil, kerosene or any fluid with a mineral base, into the system will cause the cups to swell and distort, making it necessary to replace all cups and flush the system.



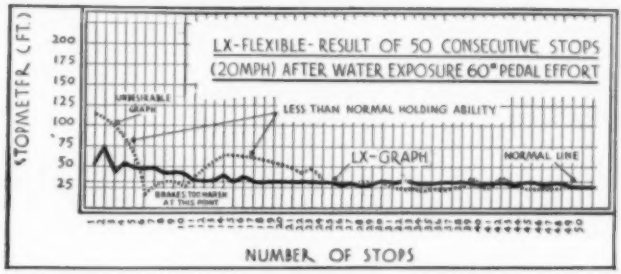
Wagner Type Cylinder Honing Set

b—Directly ahead of the master cylinder piston cup (when in normal release position) is a relief port. It is imperative that this port be open when the brakes are released. Brake pedal should be set with ½-inch free movement before pressure stroke begins. Should this port be blocked by piston cup not returning to its proper release position, the pressure in the system will gradually build up and brakes drag. Opening the bleeder screw (L-Fig. 7) will allow built-up pressure to escape and give temporary relief. Bleeder screw must be secure before car is driven.

Number 3—One Wheel Drags:

Safe . . . Even When Wet!

Some Important Facts About LX . . . The New Multibestos Brake Lining



MANY a salesman has told you—"This lining will hold wet or dry"—but never before to our knowledge has anyone offered you actual proof of brake lining wet weather efficiency.

The chart needs no amplification. The dotted line indicates the uneven performance of ordinary moulded brake lining. The solid line shows Multibestos uniformity. Uniform braking power means the elimination of grabbing brakes. It means brakes that match the tire road-holding ability. It means *safe* brakes.

Latex Bonding—the patented construction of Multibestos L X (Latex Bonded)—is the secret of its remarkable resistance to high drum temperatures—water exposure—and wear. 10% to 15% less binder is used in Multibestos L X—eliminating "bleeding" and resulting in more asbestos per foot.

Multibestos L X eliminates noise, high spots, grabbing brakes—the cause of costly readjustments of brake linings.

From the standpoint of economy alone Multibestos L X deserves your consideration. But to you to whom safety means so much the wet weather reliability of Multibestos L X is vital.

And remember—Multibestos Bus Duty brake lining, developed on the exclusive Multibestos interlocking weave principle, services with equal excellence braking mechanisms requiring a woven type of brake lining.

May we send you the complete details on the Multibestos line?

MULTIBESTOS COMPANY

GENERAL SALES OFFICES, 235 HARVEY ST., CAMBRIDGE B, MASS.

FACTORY, WALPOLE, MASS.

There are five possible causes for this condition, listed below with corresponding letters alongside of each:

a—Weak brake shoe return spring.
b—Brake shoe bearing seized to anchor pin.
c—Brake shoes set too close to drum.
d—Cups distorted.
e—Loose wheel bearings.

The respective remedies for all of these conditions are given below, with the corresponding letters alongside of each:

a—Springs sometimes lose their contracting power and take a set. Replace spring if weak.

b—Lubricate bearing at anchor pins.

c—Readjust shoes to proper clearance. Do not change anchor pin setting.

d—If in repairing wheel cylinders, kerosene, gasoline and other fluids are used as a cleaner, instead of alcohol, the cups will swell and distort. The return action of the shoes will be retarded and the brake drum will heat. Replace cups and wash unit in alcohol and dip all parts in fluid before reassembling.

e—Tighten bearings.

Number 4—Car Pulls to One Side: There are six possible causes for this condition, listed below with corresponding letters alongside of each.

a—Grease-soaked lining.
b—Shoes improperly set.
c—Dust shield loose on axle.
d—Front spring U-bolts loose.
e—Different makes of lining used.
f—Tires not properly inflated.

The respective remedies for all of these conditions are given below, also with corresponding letters alongside of each:

a—Replace with new lining of same make, if possible. Grease-

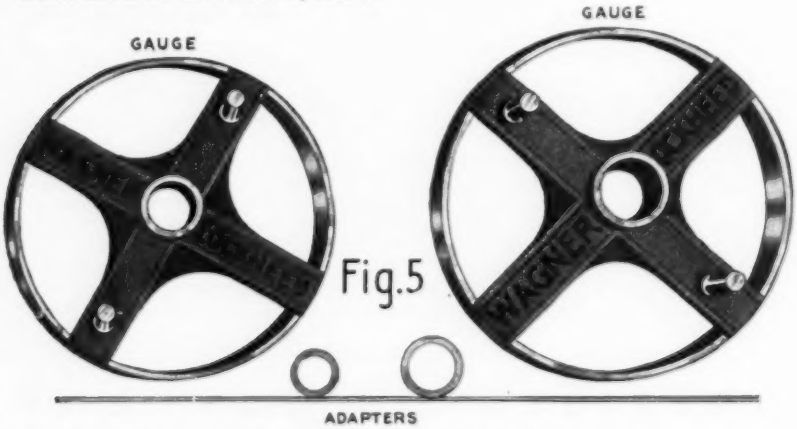


Fig.5

To obtain best results when adjusting hydraulic brakes, the mechanic should have a dummy drum, or the ring gauges pictured above, which can be obtained from Lockheed service stations.

GUN ALLOYS eliminate 3 to 5 Brake Overhauls

EVERY TIME a brake drum has to be replaced it involves considerabl expense for labor, parts and brake lining. Replace with Lempco Gun Alloys and you eliminate three to five brake overhauls—save upwards of $150 per job—because Gun Alloys outlast ordinar drums 3 to 5 times. Consider, too, tha Gun Alloys increase brake lining 200% to 300% and eliminate 75% of all brake adjustments and its apparent replacing with them saves considerable money, insures more reliable brakes.

The Purities Baking Co. use Gun Alloys with their mammoth fleet of 2,257 vehicles. Whether your fleet is large or small, you'll always use Gun Alloys after proving their amazing economy. A nearby Lempco distributor will give you overnight service. We'll send his name if you don't already know it. For practically every truck, bus and taxicab in operation.

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THEY OUTLAST ORDINARY BRAKE DRUMS 3 to 5 times

LEMPCO GUN ALLOY BRAKE DRUMS

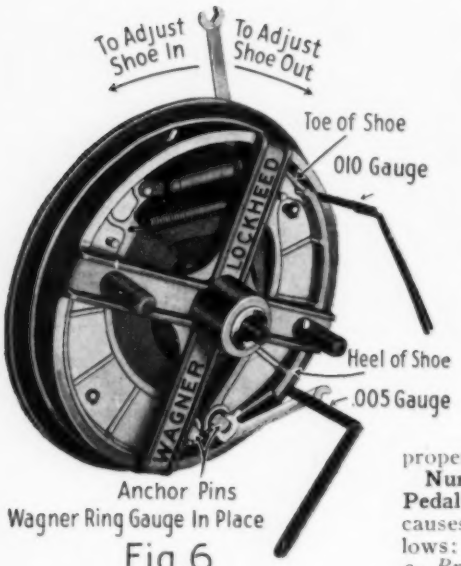

Fig. 6

soaked linings cannot be very well salvaged by washing or cleaning.

b—All car manufacturers advocate a certain shoe setting. The average is .005" at the heel or lower end, and .010" clearance at the toe or upper part. The construction of the brake is such as to cause a slight pull or drift if shoes are improperly set on the front wheels. On the rear wheels there will be no drift noticed, but one wheel will slide before the other. Readjust the shoes to proper clearance. It will be necessary to use gauge and to shift anchor pin setting.

c—Loose shields permit the brake assembly to shift on the locating bolts. This shifting changes the predetermined centers and causes unequal efficiency. Tighten shields and readjust shoes with gauge.

d—Loose spring U-bolts permit the axle to shift on the springs and run out of line. This is noticed especially when a high braking torque is developed. Tighten U-bolts at their proper location on the spring.

e—Different makes of linings have different braking efficiency. Two different makes, one with high efficiency and one with low efficiency, would cause car to pull to one side.

f—All tires should be properly inflated.

Number 5—Springy, Spongy Pedal: There are two possible causes for this condition, as follows:

a—Brake shoes not properly adjusted.

b—Air in system.

Here are the remedies for these two conditions, with the respective letters alongside of each:

a—Consult Remedy B, under Number 1.

b—Consult Remedy D, under Number 1.

Number 6—Poor Stopping, Requiring Excessive Pedal Pressure: Four causes are generally responsible for this condition, as follows:

a—Brake shoes not properly adjusted.

b—Brake pedal leverage wrong.

c—Improper or worn-out lining.

d—Oil or grease on lining.

Here are the remedies for these four conditions, lettered correspondingly for your convenience:

a—Consult Remedy B, under Number 1.

Does it mean anything to You?

We have been using this medium for nine months to inform you of the advantages of air doors for buses.

The entire story is told in our new booklet "Why Air-doors For Buses." If you are interested, write for it.

NP

NATIONAL PNEUMATIC COMPANY

Chicago Graybar Bldg., New York Philadelphia

b—Master cylinders of the box type which are mounted to the rear of the brake pedal are connected to same by a pull or push rod. This rod is fastened to the master cylinder by means of an outside lever. The outside lever should be set so that at two-thirds of its active arc it is crossing an imaginary line drawn at right angles with the push or pull rod. A lever so set gives maximum leverage and piston travel.

c—Improper grades of brake lining lose their gripping qualities after a few thousand miles. As the friction quality decreases, the pressure on the brake pedal is naturally increased to get the equivalent stop. Worn-out linings should be replaced.

d—Clean or replace brake lining.

Number 7—Light Pressure on Pedal; Severe Brakes: Three causes are given for this condition, as follows:

a—Brake shoes not properly adjusted.
b—Loose dust shields on axles.
c—Grease-soaked lining.

The remedies for these three conditions are the same as for previous conditions, so reference back is necessary as follows:

a—Consult Remedy B, under Number 4.

b—Consult Remedy C, under Number 4.

c—Consult Remedy A, under Number 4.

Should readers of this publication desire any further hydraulic brake information, or should any questions develop on this subject, we will be glad to oblige through the medium of our Trouble Shooters' Department.

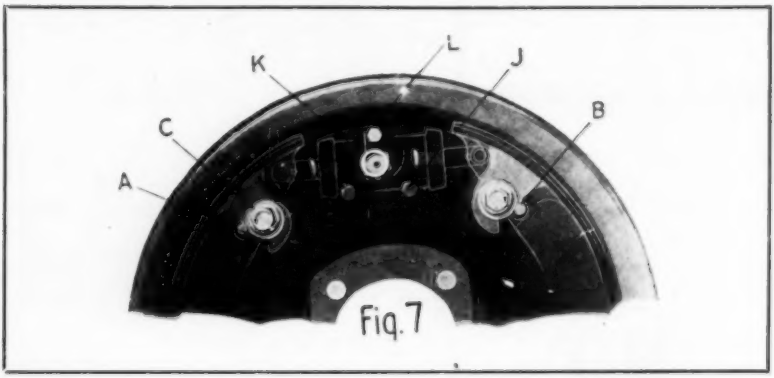

Fig. 7

Free Clutch Overhaul Book

CLUTCH replacement is easy when you have a copy of a new book entitled "More Profits in Clutch Replacements," just issued by Associated Clutch Plate Manufacturers, Chicago, Ill. Drop a line to the Editor and a free copy will be sent at once without obligation. The book describes the proper way to overhaul clutches and is profusely illustrated.

The STROMBERG MOTOSCOPE Makes YOU A "MOTOR SPECIALIST!"

For simplicity, speed and accuracy in motor diagnosis.

Consider the MOTOSCOPE method of locating trouble without removing any part of motor—It saves hours of useless labor.

Any mechanic can use without referring to instructions after three tests.

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Coil Test Alone Worth Cost of MOTOSCOPE when made under compression without removing from car.

MOTOSCOPE tests compression, points, condenser, wires, late timing, sticking or leaking valves, valve springs, gaskets, dual ignition. Sets carburetor. MOTOSCOPE helps keep your fleet "on the road" through instant trouble shooting. We will send you complete details of tests. See that you get them.

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Question-of-the-Month Club

Summary of Answers to Question No. 9

The following is a tabulation of sixty-four answers received to Question No. 9 on the subject of what work is "farmed out" and what work is performed in the Fleet Operator's own shop:

Character of Work	In Own Shop	Farmed Out
Battery Charging and Repairs	35	29
Brake Relining	51	13
Brake Drum Reconditioning	11	53
Body Repairs (General)	50	14
Body Building (Special)	23	41
Carburetor Repairs	45	19
Clutch, Transmission Repairs	59	5
Connecting Rod Rebabbiting	6	58
Cylinder Reconditioning	26	38
Electrical Unit Repairs	26	38
Engine Rebuilding (Complete)	52	12
Engine Repairs (Minor)	62	2
Fender Repairs	54	10
Frame, Axle Straightening	34	30
Glass Replacement	34	30
Greasing and Lubricating	62	2
Painting of Vehicles	44	20
Piston Ring Replacement	62	2
Radiator Repairs	11	53
Rear-End Overhauling	61	3
Speedometer Repairs	12	52
Spring Repairs, Replacement	40	24
Tire Vulcanizing, Repairs	7	57
Tube Patching	40	24
Valve Grinding; Refacing	60	4
Washing Cars, Trucks, Buses	60	4
Welding Broken Parts	41	23
Wheel and Axle Aligning	45	19

Editor's Note:—Although the above "survey" represents a very small portion of our entire circulation, it will serve to give a general idea of the various lines of work which fleet operators have found it advantageous to "farm out" to other shops. Good maintenance does not necessarily mean that all work should be done in the fleet owner's own shop.

In order to make future surveys in the "Question-of-the-Month Club" broader in scope, the cooperation of every reader is earnestly solicited. The more replies we get to these questions, the better we will be able to serve you. All answers will be held strictly confidential.

Please Fill Out Question No. 10 on Opposite Page

(Please tear out and mail to the Editor, The Fleet Owner, 90 West St., New York)

Question-of-the-Month Club

Question No. 10—Tires

Have you a "tire-contract" or do you purchase tires outright?.....

.....

Do you keep records of your tire mileage and costs?.....

If so, please give your tire cost per vehicle, per mile, or in any way that you have figured it.....

Are tires bought on a "first-cost" basis, or do you consider the "cost-per mile" when taken out of service? .....

How often are the following tests made? (Please report on each.)

Test for proper inflation?.....

Check for glass, nails, etc., in tread?.....

Test for leaky valves?.....

Check for missing lock nuts, caps, etc?.....

Check for small cuts and injuries?.....

Check for extreme tire wear?.....

Check for proper wheel alignment?.....

Examine for bent rims?.....

Examine for loose wheel bearings?.....

Tightening all lugs and bolts?.....

Do you repair your tires and tubes, or is this work "farmed out" to other shops?.....

Vehicles on solid tires and single pneumatics can be economically changed over to dual balloons. Shall we send you a free booklet explaining just how this can be done?.....

Special Remarks.....

.....

.....

We operate.....*Trucks;*.....*Busses*.....*Passenger Cars*

Name of Firm.....

Address.....

City and State.....

Your Name.....*Position*.....

(Please tear out and mail to the Editor, The Fleet Owner, 90 West St., New York)

A Course *in* Automotive Ignition

By M. Mallory.

President, Mallory Electric Corporation

Article XXII—Automatic Spark Control

SPARK timing undoubtedly has more to do with engine efficiency than almost anything else. This is proven by the fact that the engine is more sensitive to variations in ignition timing than it is to any other adjustment.

In Figures 2, 3, 4 and 5 shown in Chart No. 30, the pressure rise is indicated when the spark occurs 10, 20, 30 and 40 degrees before top dead center.

In referring to Figure 2, it will be observed that the spark occurs 10 degrees before top dead center, and the pressure rise, due to the expansion of gases, does not reach its maximum until the crank is 30 degrees past dead center. It will be seen that the pressure exerted against the piston is approximately only 200 pounds. The reason for this is that the piston had started down before the burning of the gases had gotten under way, and that the decrease in pressure, due to the piston going downward, caused the burning of the gases to be slower; resulting in a low pressure or energy being exerted against the piston.

In Figure 3 it will be seen that the spark occurred 20 degrees before top dead center, and the pressure rise was greater. It was raised to 300 lbs. In this case, a 300-lb. pressure was exerted against the piston at 20 degrees past top dead center, instead of a 200-lb. pressure exerted against the piston 30 degrees past top dead center, as indicated in Figure 2. The timing of the spark in Figure 3 would cause the engine to deliver more power than the timing of the spark as indicated in Figure 2.

In Fig. 4, the spark occurs 30 deg. before dead center, and the pressure rise reaches 350 lbs., which is still higher than indicated in Fig. 2 or Fig. 3. This spark timing causes greater energy to be exerted against the piston than when the spark is timed as indicated in Fig. 2 or Fig. 3. The energy in Fig. 4 is also exerted at a time when the connecting rod has a greater leverage on the crankshaft than it does as indicated in Fig. 2 or Fig. 3.

In Fig. 5, the spark occurs 40 deg. before dead center. The pressure rise is approximately the same as indicated in Fig. 4, but the pressure exerted tends to oppose the piston before it reaches top dead center. In this case, there will be a loss of power. The spark timing in Fig. 4 will cause the engine to

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(1) . . . Danger from flying glass. Protex Glass cannot fly! In case of severe accident, if the glass cracks, these fine horizontal nichrome wires will hold the pieces safely in the frame. Consider this when you equip your car or fleet—for 65% of all collision injuries are due to flying glass!

(2) . . . Blind driving in bad winter weather, when sleet, snow, ice-forming rain impair your windshield's clear vision.

The Protex Glass Company has perfected a method to eliminate this blind-driving hazard. By connecting the fine nichrome wires imbedded in Protex Sleet-Proof Glass to the storage battery, the glass can be heated sufficiently to prevent sleet, snow or ice from adhering to it. The method is simple and practical, and consumes a negligible amount of current.

Protex Glass is solid plate glass . . . neither time nor exposure to heat or moisture can effect its visibility.

Investigate!

Protex GLASS for SAFETY

Write for descriptive literature

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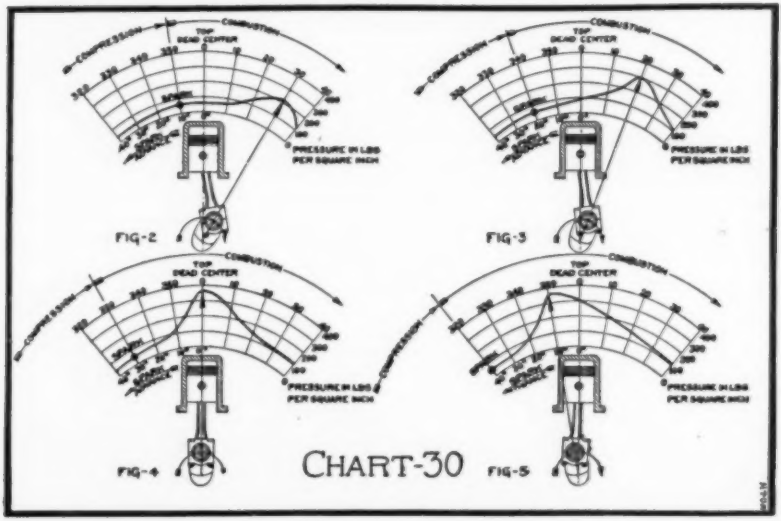
220 FIFTH AVENUE NEW YORK, N. Y.

deliver the most power.

It will be understood that the figures referred to and the above explanations cannot be considered as a standard to follow, due to the variations in compression of different engines. Some engines, even of the same model, will not stand as much spark advance as others. The indications shown in Chart No. 30 are based upon results obtained from an engine operating at a constant speed.

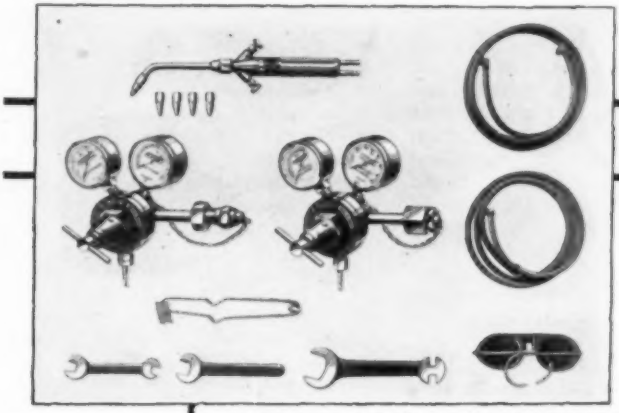
As above explained, variations in speeds require variations in spark timing, which has been accomplished by the automatic or centrifugal governor. The reason that the spark timing should be varied with the engine speed or the rate of piston travel is because a certain length of time is required after the spark occurs for the pressure of the burning gas to reach its maximum. For this reason, the spark should be advanced according to the engine speed. This makes an automatic or centrifugal governor necessary to obtain maximum efficiency from the engine, especially engines used in automobiles, which operate at variable speeds.

The automatic governor is one of the most important mechanisms in the engine, because it is relied upon to time the engine so that the spark will occur at a time to cause the expansion of gases to exert the greatest energy when the crankshaft is past dead center, so as to obtain the greatest power. If the spark occurs too early, part of the force caused by the explosion will oppose the piston on its upward stroke, which results in loss of power. If the spark occurs too late, the result will be slow burning, overheating of the engine and loss in power. There are many engines that use too much gasoline,



FOR WORK ON THIN METAL

YOU'LL LIKE THIS NEW PREST-O-WELD OUTFIT



TYPE W-107

THIS outfit, with the new Prest-O-Weld Type W-107 Welding Blowpipe, is specially designed for precision welding on light metal, lead-burning, soldering, brazing and radiator repair. It is especially adaptable for aircraft fuselage welding and other fine work on thin gauge material.

The Prest-O-Weld Type W-107 Blowpipe is 10½ inches long and weighs only 10 ounces. Its mixing chamber is immediately in front of the handle. Oxygen and acetylene valves are located so they can be adjusted readily with the thumb and forefinger of the right hand. The five tips furnished as standard meet all welding requirements for metal up to ¼ inch thick.

Ask your jobber to let you examine this outfit. Note how light and finely balanced the Type W-107 Blowpipe feels. Try it yourself and see how easy it is to use. Also notice the quality of material and workmanship that Oxweld has put into every unit of the outfit . . . This, and all Prest-O-Weld outfits, are made by Oxweld, the world's largest manufacturer of welding and cutting apparatus. Write us direct for further information.

The Prest-O-Weld Type W-107 Light Welding Outfit consists of:

1 W-107 Blowpipe with 5 tips, Lighter and 2 Wrenches

1 Type R-106 Oxygen Regulator with 50-lb. and 3,000-lb. gauges and Wrench

1 Type R-107 Acetylene Regulator with 30-lb. and 350-lb. gauges

2 25-ft. lengths, ⅜-in. Hose

1 Pair Fibre Spectacles

4 Hose Clamps

Instruction Books

Price $49.50

•

Prest-O-Weld Type W-107 Welding Blowpipe only, with 5 tips, Lighter and 2 Wrenches

Price $14.25

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Prices slightly higher West of the Rocky Mountains

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THE LINDE AIR PRODUCTS COMPANY

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Cincinnati	Milwaukee	San Francisco
Cleveland	Minneapolis	Seattle
Denver		Tulsa

run hot and go to pieces due to excessive vibration because the spark is not properly timed.

Some engineers prefer full manual control instead of automatic, probably because their experience with the automatic governor has not been satisfactory or reliable. However, the principle of the automatic governor is right, and its development is a great advance over manual control. The automatic governor has many advantages over manual control, providing it functions as it should. But, if it is not functioning properly, or to meet the particular requirements of the engine on which it is placed, it is impossible for the operator or repair man to adjust the timing to get the desired results by resetting the timing manually.

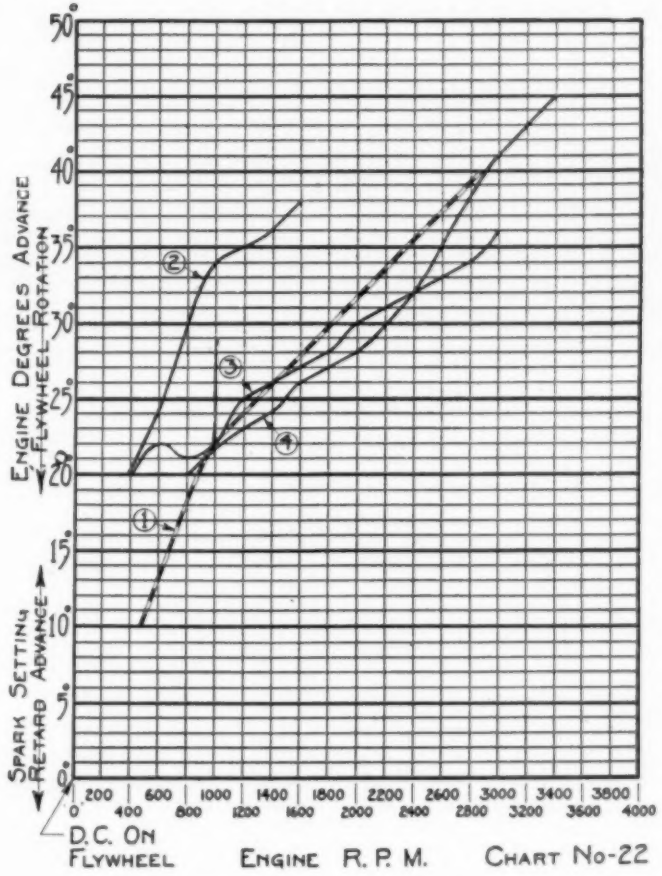
If the automobile dealers and service stations had reliable means to accurately test governors and were supplied by their manufacturers or the engine builders with charts showing the advance curves suitable for the different engines, they could overcome a lot of their troubles, but without this information they are at a loss. Consequently, many engines are burning too much gasoline, overheating, knocking and do not have the power and speed they should have, because the timing, which has more to do with the operation of an engine than anything else, is wrong and cannot be corrected by advancing or retarding the spark manually as long as there is an improperly functioning governor with which to contend.

A successful automatic governor offers a difficult problem, because the governor must be designed to be free from friction; the parts must be accurately machined and the springs and arrangement of them must be of such material and design that they will not be overstressed, causing them to become weak. The governor must have enough power so that it will start to advance at low engine speed and still not advance too rapidly or "hunt," due to backlash. It should be designed so that the service man can easily adjust it to get the proper results from the engine. The adjustment of a governor is as essential as the adjustment of a carburetor.

To substantiate the above facts, refer to Chart No. 22. Curve 2 was produced from a governor in a distributor that was removed from a large motor coach. It will be observed that this governor started to advance at 400 engine speed and had advanced 18° on the fly-wheel when the engine reached 1600. This governor should have started to advance at 600 engine speed and advanced the timing 20° on a straight line when the engine reached a speed of 2800. It can be seen that, with this governor functioning as it did, it would be impossible to get proper results out of the engine, regardless of the condition of the engine or adjustment of carburetor. This governor advanced too rapidly, causing the engine to knock and buck against itself. To overcome this, it is necessary to retard the timing, but, when this is done, the spark will be too late at high speed, causing an increase in gasoline consumption. In fact, the curve produced by this governor prevents efficient operation of the engine, regardless of where the timing is set.

Curve 3 was produced by a governor removed from a passenger car.

(Please turn to page 42)



The various curves appearing on this chart are representative of the actions of various types of automatic spark advance governors. The comparisons are outlined in detail in the article accompanying. The author gives these comparisons to emphasize the need for improvement in this type of spark control.

This governor should advance the timing 20 degrees on the flywheel on a straight line, starting at 400 engine speed and finishing at 2800 engine speed, but it will be noticed that the governor "hunted" badly due to backlash. It advanced 2 degrees at 600 engine speed, then retarded 1 degree between 600 and 800 engine speed, causing a flat spot in the engine on acceleration. The governor should advance 20 degrees at 2800 engine speed, but it only advanced 14° at this point. Its full advance was only 16° at 3000 engine speed, when it should have been 20° at 2800 engine speed. If the timing was advanced so that it would be early enough at high engine speed, it would be too early at low engine speed. Therefore, with this governor, it would also be impossible to obtain efficiency from the engine.

Curve 4 was produced from a governor removed from another car. The specifications called for 20° advance on the fly-wheel, starting at 600 engine speed and finishing at 3200. It can be seen that this governor actually advanced 5° more than it should, and the curve was very irregular, due to friction and back lash.

The distributors that produced the curves 2, 3 and 4 were removed and other distributors which produced curves suitable for the engines were installed in their place. In all three cases, there was a great improvement shown in power, performance and gas mileage. The engines were also much smoother, because the vibration caused by improper timing was eliminated.

In many engines which spark knock at certain speeds, the trouble is generally blamed on high compression, but in most cases it is due to improper functioning of the governor, such as advancing too rapidly at certain points, which might be due to weak springs, backlash, worn parts or the governor producing the wrong curve for that type of engine.

Some engines will stand but very little advance, and a governor manufactured for this type of engine must produce a curve that will stay within very close limits. In the older engines, where 40° and 50° advance was used, the engine was not so sensitive to the ignition timing. Therefore, it was not necessary to build a governor for them that would produce a curve within close limits.

It is very essential that the governor has power enough to start to expand at low engine speeds. To accomplish this several means are used. One is to use heavy weights, so that it will expand at low speed, but the disadvantage of a governor of this design is that the heavy weights will throw out too fast. This will cause the spark to be advanced too far relative to the engine speed. To overcome this, it is necessary to increase the spring resistance on the governor, but when this is done the governor will not start to expand properly at low speeds.

Other means are used to prevent the governor from expanding too quickly. One is to use light weights, but when this is done the governor will not expand at low engine speeds, unless very weak springs are used. This will cause the governor to "hunt" and be noisy at low engine speeds.

It is impossible to adjust most governors to meet different engine conditions. If the governor expands or throws out too rapidly at the higher speeds, the only means

(Please turn to page 65)

It's the Surplus that Means Satisfaction

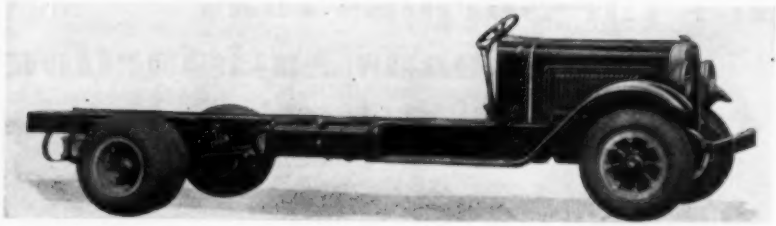
This fleet of nine Continental-powered, 1-ton Brockway trucks is operated by the Kresge Department Store in New Jersey. These trucks are powered with Continental 16C six cylinder engines — designed for fast, light delivery service.

With Continental engines — repairs and replacements are cut to an absolute minimum. Each Continental engine is designed to give more than is required of it — to carry a reserve of power and stamina that means continuous service. Continental engines are built to more than manufacturers' requirements — to the greater satisfaction of consumers.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, Mich., U. S. A. *Factories:* Detroit & Muskegon

Continental Engines



Stewart *Offers an* Eight

Model 38-8, a 3½-Ton Capacity Job, Said to Do 50 to 60 Miles Per Hour With Load

THE Stewart Motor Corporation of Buffalo, N. Y., announces this month a new eight-in-line, 3½ton chassis, designed for long distance movers, haulers and all lines of work demanding high speeds and power. According to the makers, this new eight is speedier than a six of the same horsepower, due to smaller reciprocating parts and less weight per horsepower, permitting the hauling of more ton miles per year and capable of making 50 to 60 miles per hour with load.

An eight-in-line engine of the L-head type is used, with a bore and stroke of 3¼ x 4¼ inches, developing 130 h. p. Piston displacement is 420 cu. in. This engine is said to develop its greatest torque at slow speeds, thereby giving good performance in high gear. Suspension is of the three-point type, mounted on rubber with crankshaft balancer at the front end. Lubrication is by pressure. Valve stems and tappets are lubricated by spray from the crankcase. Cylinder block and crankcase are cast integral, with removable head and Swan-type manifold having heat control.

The radiator shell is polished cast aluminum, having a vertical tube core, 20-inch fan, water-pump circulation with thermostat. A battery ignition system is used, with semi-automatic distributor located on top of cylinder head. Starter and electrical equipment is Delco-Remy. Large chrome-plated head-lamps and cowl side lamps are standard. Carburetor is by Stromberg, equipped with air cleaner.

A large, dryplate, multiple-disc clutch of the gear-tooth type is used, being automatically adjustable for wear. Light pedal pressure is possible through special reduction. The throwout bearing is lubricated by an Alemite fitting from outside the case. The transmission provides 12 speeds forward and three in reverse, being composed of a standard four-speed transmission attached to the engine, and a 3-speed auxiliary

(Please turn to page 46)

Just Another Reason for DUCKWORTH

Tested and Inspected. In addition to a searching strain test, every Duckworth Chain is gauged for pitch and length. No guesswork. The machine tells the story.

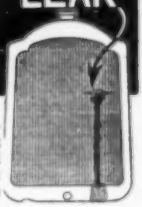
Specify Duckworth, the *tested* Timing Chain. For sale by N. A. P. A. jobbers everywhere.

BALDWIN-DUCKWORTH CHAIN CORPORATION

Duckworth Division
SPRINGFIELD, MASSACHUSETTS

D U C K W O R T H

STOP THAT LEAK WITH SMOOTH-ON No. 1



YOU can apply Smooth-On with radiator full or empty, hot or cold, without removal from the car and without putting anything inside that clogs the circulation.

Merely roll the Smooth-On into a stiff putty, press it against and into the leak with your thumb or pack it into the defect with a knife blade or screw-driver, and scrape off the excess. The leak will stop instantly and the repair is permanent.

Cracked Water Jackets

Water jackets of automobiles, stationary or marine gas engines which have developed long or short cracks or have even had pieces broken entirely out from freezing can be made thoroughly and lastingly serviceable by similar repair, or by applying Smooth-On under straps or a plate.

Get Smooth-On No. 1 in 7 oz.; 1-lb. or 5-lb. tins at any hardware store or if necessary direct from us.

Write for FREE BOOK

Free Booklet

tells how to stop gas leaks from the tank, gasoline lines and exhaust system, oil leaks at gaskets and at cracks in crank or gear case. It also tells how to make headlight posts, nuts, hub caps and belts and grease cups stay tight, etc.

Mail coupon for a copy.

Do it with SMOOTH-ON

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574 Communipaw Ave., Jersey City, N. J.

Please send the free Smooth-On Repair Book,

Name .....

Address .....

4-31 .....

transmission mounted amidships. Both units are of the heavy-duty type with nickel steel gears, and are equipped with standard, S.A.E. openings for power take-off. An overdrive gear permits slower motor speed on long, fast runs.

The gear ratios are as follows: Low 6.92:1; Second 3.47:1; Third 1.89:1; Fourth 1:1; Reverse 8.06:1. These are with the standard, unit-power-plant transmission, of course.

With the auxiliary transmission, three speeds are provided, as follows: High 1:1; Overdrive .67:1; Low 2.25:1. With standard rear axle ratio of 7.3:1 the total gear reductions *in low* are as follows: First 114:1; Second 56.9:1; Third 31:1; Fourth 16.4:1; Reverse 132:1.

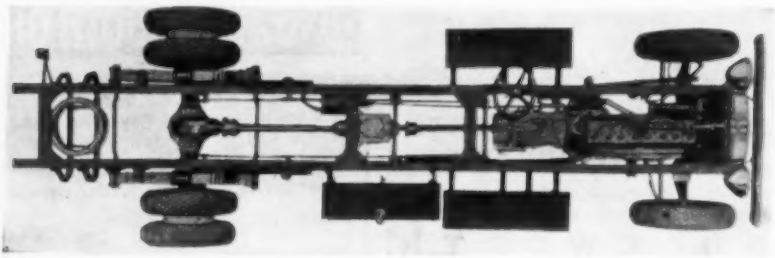
A 2¼-inch tubular drive shaft is used having three large metal-covered, dust-proof joints. Center joint is supported on SKF self-aligning ball bearings contained in an oil-tight and dust-proof housing.

Front axle of the new Eight is of the dropforged, I-beam, reverse Elliot type with Timken bearings in the hubs and ball thrust bearings on the king pins. Rear axle is a Timken, full-floating job, with double gear reduction. Worm drive is optional, the double-reduction carrier and worm carrier being interchangeable in the same housing, which is made of pressed steel with nickel-steel sleeves. Differential is of the block type with four pinions, and together with the wheels, both are mounted on Timken bearings, with axle shafts of nickel chromium alloy steel.

Front springs are 40 x 3 inches with one-inch spring pins and bronze bushings. Fourteen leaves are used, of alloy steel. The rear springs are 56 x 3 inches, having 1¼-inch spring pins. The main spring has fifteen leaves and the auxiliary springs have six. The latter are standard equipment. Steering is by Ross, of the cam-and-lever type with low ratio and 20-inch diameter steering wheel. Frame side rails are 9 inches deep and 9/32 inches thick, of heat-treated, high carbon steel.

Bendix Duo Servo service brakes operate on all four wheels, mechanically controlled by rods on the rear and cables on the front. Front brakes are 16 x 2½ inches and rear are 17¼ x 4 inches. A large B-K vacuum booster is standard equipment.

(Please turn to page 48)



STOP SHIMMY

with the new self-locking

BEAR SHIMS

Only shim of its kind—ABSOLUTELY *can't lose out.* Corrects axle tilt and stops wander, weave, hard steering, and shimmy. Inserted between spring and axle by merely loosening U-bolt. Sizes for all cars, trucks and buses. Order from your jobber or send direct.

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Top view showing how large truck rims are supported on lugs on outside of arm.

PE-KO Tire Changer

Handles every tire changing job speedily and easily. Disc, wire or Ford wheels, solid or split rims are all alike to PE-KO. This one machine does all tire changing jobs. Saves time, labor, money, rims, tubes and casings. Keeps the fleet moving. Small, yet built like a battle ship.

Order Direct and Give Jobber's Name
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Rough Flanges don't mean Leaks . . .

When you tighten the nuts on a Vellumoid connection, the Vellumoid gasket is compressed, filling every irregularity in the flanges, and ensuring a tight connection which stays tight and protects your work.

Forget the shellac—you don't need it with Vellumoid.

Ask Your Jobber

VELLUMOID
THE IDEAL REPLACEMENT GASKET MATERIAL

For the Oil, Gasoline and Water connections

The Vellumoid Co., Worcester, Mass.

The hand brake is of the contracting type, mounted on the driveshaft flange at rear of transmission and measures 11 x 5 inches. Dual rear balloons, 9.00 x 20 are standard, while 9.75 x 20 are optional at extra cost. Wheels are of the caststeel, hollow-spoke type. Body lengths from 11 to 18 feet can be accommodated on the chassis.

A 31-gallon gasoline tank is mounted on the side of the frame, while a special 30-gallon tank can be placed under the seat at extra cost.

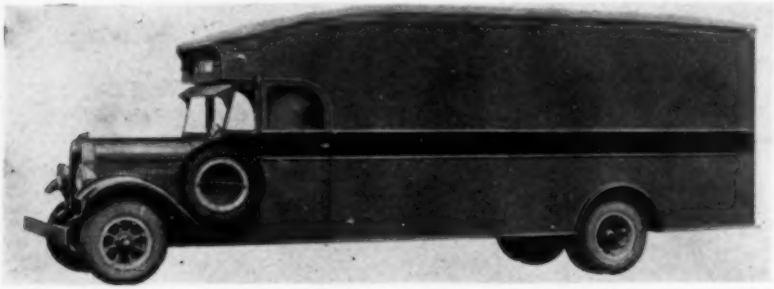
Engine driven fuel pump supplies gasoline to the carburetor. Gasoline gage on side-mounted tank is standard equipment.

The standard wheelbase is 170". Special wheelbases at extra cost are 196", 226" and 241".

Equipment provided is as follows: Electric starter and generator, electric lights, cowl side lights and horn, battery, tool kit, jack, spare tire carrier, spare rim, front bumper, speedometer, windshield wiper and mirror on all cabs and bodies. Air cleaner, thermostat, stop light, and Alemite grease gun. The natural wood finish steel instrument board is equipped with ammeter, oil gage, starting choke button, lighting and ignition switch with indirect lighting and manifold heat control button.

Painting is standard as follows: Hood, cowl and chassis Stewart green, sides and aprons handsomely finished in baked black enamel. Wheels Stewart red.

The chassis weight on the standard wheelbase is 7600 pounds. Any further details that may be desired can be obtained without obligation directly from Stewart Motor Corporation, Buffalo, N. Y., or from the Editor of this publication, who will see that you are promptly supplied.



The Stewart 38-8 is especially designed for long distance movers and all lines of work demanding high power and speed.

Reports Business Improving

H. A. PIERCE, sales manager for Burgess-Norton Mfg. Co., has recently completed a five-week trip through the South. He reports business in the Southeast improving, while business in the Southwest is about holding its own. Several new accounts with jobbers have been opened, according to a factory announcement.

K-D

PROFIT LIFTERS

The fastest, simplest tool ever designed for removing and replacing the 2-piece valve keepers on modern "low port" motors — K-D No. 603 Valve Spring Lifter Set.

THE K-D MANUFACTURING CO., Lancaster, Penna.

PISTON PROFIT

—is the title of a new folder just off the press. It will show you the way to cheaper miles and carefree service with DELUXE PISTONS. Send for your copy today.

Deluxe Products Corp.
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WANTED!

¶ On page 35 is a form, ready to be filled out. Maintenance men are urged to cooperate in joining this new form of "club."

¶ In order to become a "member" it is simply necessary to participate in these questions and answers, only when you choose to do so, of course, there is *no* fee, *no* dues, and no limitations.

¶ We would like to see every reader join. See pages 34-35.

The Editor

Bigger loads-fewer drivers

Make yours a heavy duty fleet with Little Giant 6-Wheelers—without adding to operating expense. Only 3 hours to install and 8 holes to drill. Two point frame contact—strong—correct balance and traction. New lower prices. Write today for full information.

Little Giant Products, Inc.
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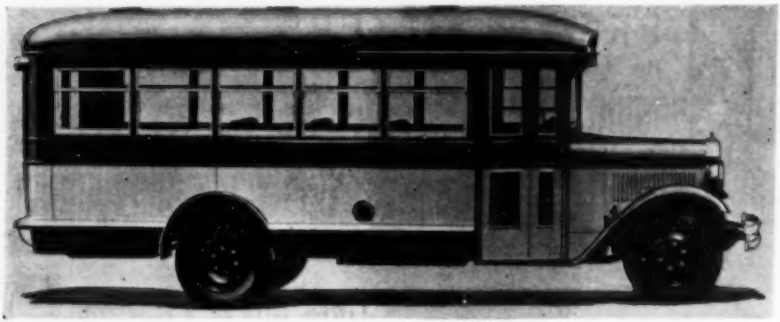
LITTLE GIANT 6-WHEELER



6-Cyl. Coaches *by* Fargo

Companions to Eight-Cylinder Models are Offered in Street-Car and Parlor Coach Types

TO supplement its line of eight-cylinder motor coaches recently introduced, the Fargo Motor Corporation, Detroit, Mich., announces a similar series on a six-cylinder chassis. The new line comprises a Street-Car coach with seats for 21 passengers, and a Parlor Coach with seats for 16 riders, both of which, like their eight-cylindered companions, will be sold directly to bus operators. These new Fargo coaches are of the conventional type, in contrast to the original, unique design which marks the eight-cylinder series and are designed especially for those operators whose needs do not require the more advanced features and larger capacity which the first models provided.

Among the features given out by the manufacturers are: six-cylinder engine of 96 horsepower; full-floating rear axle of the spiral-bevel type; double-drop frame to provide low center of gravity; four-speed transmission of the heavy-duty type; four-wheel internal hydraulic service brakes with booster; propeller-shaft type of hand brake.

In the engine are found such features as seven-bearing crankshaft; aluminum alloy pistons of the ventilated-bridge, split-skirt type; full force-feed lubrication and high-turbulence combustion chamber. Rigid rear and spring front mounting, it is said, checks vibration and adds to frame strength, while oil-wetted air cleaner, oil filter, thermostat and crankcase ventilator assure greater operating efficiency and longer engine life. Gasoline pump with filter and manifold heat control are also provided.

The frame of the new coaches, of 10-inch section, is of the double-drop type. Rear axle is of the full-floating, spiral bevel type, with cast steel housing, utilizing tapered roller bearings. Steering gear is of

the worm-and-sector type, with varying ratio. Clutch is a single-plate dry type, 13 inches in diameter, with moulded facings.

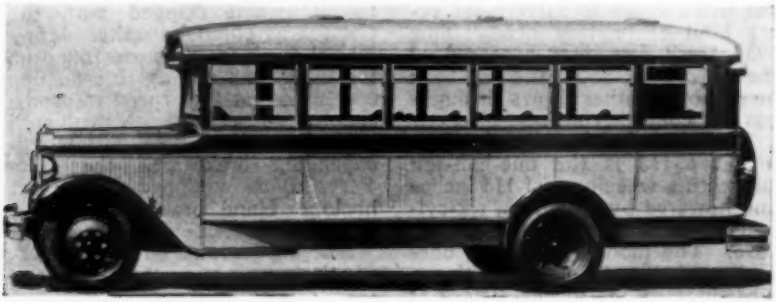
The braking system is of interest, since a vacuum-type booster is incorporated in the system. Cast iron brake drums are used, 16 inches in diameter. Total braking area of service brakes is 350.11 sq. in. The hand brake is of the improved ventilated disc type, mounted on the propeller shaft, back of the center bearing. It operates on both sides of the disc and has a braking area of 44.4 sq. in.

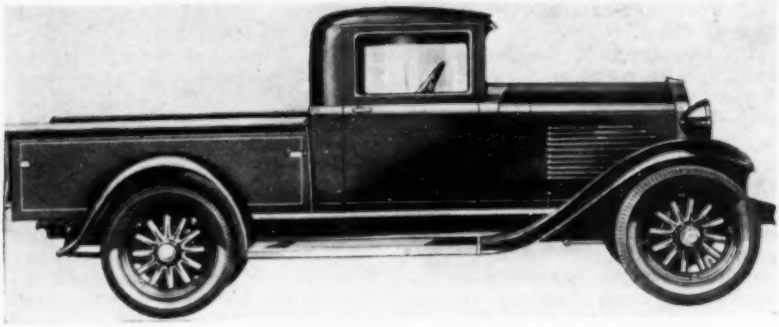
Electrical system is of the 12-volt, heavy-duty coach type, with a 120 amp. hr. battery. The 225-watt, 12-volt generator is driven by double V-belts that also drive the water pump. Balloon tires, size 7.00 x 20, 8-ply, dual rear are standard equipment on the Parlor Coach and 7.50 x 20 on the Street-Car coach. Fuel tank is located outside of frame on right side and has a capacity of 40 gallons. Wheel tread is 64¼ inches front and 66¾ inches rear. The wheelbase is 165 inches.

The Street-Car coach has seats for 21 passengers. Headroom, aisle space and leg room are ample, the seats and backs being upholstered in genuine leather. Grab handles are provided on the aisle side of cross seats. Seats in the Parlor Coach are of the chair type, with air-filled spring cushions upholstered in genuine leather. Detachable seat-back covers are also of leather. Side windows in both coaches are of the raised type, the upper transoms being fixed. Rear windows are stationary, fitted with wire-reinforced glass. Shades are fitted in the Parlor Coach. Window at the left of driver has sliding panel. The windshield is of the one-piece, stationary sloping type.

Entrance step is all metal, with non-skid safety tread. Signal system is of the bell cord type. Destination sign is of the roller type, accommodating two lines of names. The Street-Car coach is equipped with advertising racks. Grab rails in this type consist of one stanchion at left of entrance door, one behind driver's seat and two on ceiling.

Interior of Street-Car coach is equipped with six 21 c.p. dome lights, while that of the Parlor Coach is provided with ten 15 c.p. dome lights. Both coaches have two marker lights at both front and rear.





The New Willys Trucks

Truck Line for 1931 is Offered in Half-Ton and One-and-One-Half-Ton Rated Capacities

A NEW line of one-half and one-and-one-half-ton commercial chasses, complete with bodies for many business needs has been recently announced by Willys-Overland, Toledo, Ohio, and designated as the Willys Truck. These new models are available in closed cab pick-up body, de luxe sedan delivery body, dump body, stake body, panel body, canopy body and packers' body, and various other types to meet most every kind of haulage need. This 1931 truck line first appeared at the New York Show and has been on exhibit at other shows throughout the country since.

Two models are offered. The model C-113 is the one-half-ton unit with a wheelbase of 113 inches and powered by a 65-h. p., six-cylinder engine. The chassis lists at $395. The model C-131 is a one-and-one-half-ton unit, with a wheelbase of 131 inches, listing at $595. Both chasses use the same engine, which has a bore and stroke of 3¼ x 3⅞ inches, a piston displacement of 193 cu. inches and an S.A.E. h. p. rating of 25.35. Actual horsepower developed is 65, at 3,400 r.p.m. The engine is a six-cylinder job of L-head construction, with removable head, of course.

All bodies on both chasses are completely manufactured, painted, mounted and shipped with the chasses as complete units. Many typical truck features are found on the C-131 job, such as full-floating rear axle and four-speed transmission. Both models are equipped with four-wheel Bendix, internal-expanding brakes of the Duo-Servo type, equipped with cable hookup. Hand brake operates on all four wheels.

Steering gears on both models are of the worm-and-gear, semi-irre-

(Please turn to page 66)

Automatics *by* Fruehauf

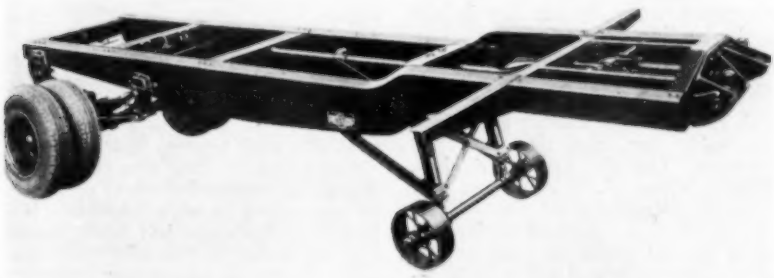
New Type of Semi-Trailer Has Automatic Coupler and also Features Power Brake Lock

THE new Fruehauf automatic semi-trailer models, as recently introduced, are the result of several years of careful study and analysis of modern transportation requirements. They are entirely automatic in the coupling and uncoupling operations and incorporate many new features and refinements not found in former models.

With the almost universal use of pneumatic tires and the more effective enforcement of laws pertaining to gross vehicle weights and axle loads, has come a demand for a new type of trailer. The first requirement made of this new trailer is an ideal distribution of the payload on the trailer and tractor axles. Secondly, the unit must be as light as is consistent with sound engineering practice. Thirdly, it must be economical in maintenance and upkeep. And, finally, it must be built in standard models in order to realize maximum economy in manufacture and distribution.

Let us describe briefly the outstanding features of the new Fruehauf automatic semi-trailer, as furnished by the manufacturers: The frame as designed is fabricated from pressed steel throughout. On the larger models the side rails have a maximum depth of 12 inches at the point of greatest stress and taper at both front and rear end. This results in uniform stress and minimum deflection for the maximum rated capacity and at the same time provides an ample factor of safety. The flanges of the side rails are wide, providing strength to withstand side thrusts. Flange widths are increased at the rear end of the lower flanges where the spring hangers and radius rods are attached. This eliminates the possibility of failure due to unusual strains from road impact and braking torque. This wide flange also stiffens the chassis laterally when the under structure is attached.

The new trailers have been de-



signed by Fruehauf as a step forward in the progress of the trailer industry and also to give the customer a larger payload on the same size of trailer. The change from built-up structural steel to pressed steel frames is radical but perfectly in keeping with modern trends in auotmotive design.

The side rails have a downward sweep at a point to the rear of the fifth wheel, allowing operating clearance for the tractor-truck and providing for maximum tire width in accordance with state laws. This drop in the frame permits the use of conventional type of body cross sill without increasing the platform height of the trailer. Steel outriggers or frame brackets are supplied for supporting the body forward of the drop in the frame instead of cross sills. In this way the flooring may be laid flush with the top of the frame at this point of the chassis.

A sufficient number of cross members are built into the side rails. Each is one-piece die-formed steel with integral gussets. Maximum strength with less weight is the result.

The auxiliary wheels or landing gear have been simplified and strengthened by the new design and all operating parts are contained within the flanges of the frame section. Adjustment is provided for increasing or reducing the height of the landing gear to accommodate any height tractor frame or tire size.

The brakes have been enclosed with pressed steel shields which are removable for inspection and adjustment. On the heavier models, Westinghouse slack adjusters for external adjustment of the brakes, are supplied as standard equipment. They are attached directly to the brake cam shaft and are readily accessible from the rear of the trailer.

Brake cam shafts and cross shafts are mounted in self-aligning ball bearings, reducing friction and cutting losses of energy in the braking mechanism to a minimum. An entirely new feature has been incorporated in the braking system, known as a power brake lock. This makes it possible to utilize the full effort of any one of the several power brakes now available for trailer use as a parking brake when the trailer is disconnected as well as serving as a service brake when the unit is in operation.

The brakes are applied by the usual power brake control in the tractor cab. When the brakes have been set, a lever conveniently located at the left of the operator is pulled up and this mechanically locks the power brakes in applied position. They are held in this position automatically after the tractor-truck has been disconnected. When the tractor-truck is again connected to the trailer, this brake lock automatically releases when the coupling operation is completed. The brake lock can also be released manually by means of a lever located on the side of the trailer.

The new trailers are available in various lengths up to 22 feet and in capacities up to 15 tons. The frame width is 40½ inches and the spring center is 41 inches, providing room for the use of tires up to 10.50 dual balloons without increasing the overall width of 96 inches—the legal limit in most states.

The new Fruehaufs are also available with tandem rear axles on either single or dual tire equipment for use in territories where this type of equipment is advantageous. Interesting literature has been issued that describes completely this new line. Sent free on request.

The Trouble Shooter

A DEPARTMENT devoted to correspondence from readers of THE FLEET OWNER. Any questions having to do with fleet maintenance will be answered. All properly signed inquiries will be replied to by mail and such of them as are believed to be of interest to other readers will be published in these columns.

Address your questions to the Trouble Shooter Editor. We must decline to reply to correspondence not signed with the writer's full name and address.

Burns Bearing Every 30 Miles

Question: We have a Graham Brothers Truck having a Dodge Senior Six motor. The trouble is it cannot keep a connecting-rod bearing. To remedy this we ground the crankpins and rebabbitted all the rods to suit. We inspected the mains, oil-line, pump, etc. It will only run about 30 miles and then burn a rod bearing. What can you suggest for us to do?—J. A., Waterbury, Conn.

Answer: At first thought, it is possible that your main bearings are loose, or improperly fitted, and that the oil drips out at the sides and does not push through to the connecting rod bearings, thus "starving" them, particularly the one that always burns out. Since you seem to have checked all the oil lines, pump, etc. we are inclined to think this is your trouble. Our suggestion is that you remove the oil pan, and connect an oil pipe into the motor, in the place where the pipe from the oil pump goes. Then get a small tank of oil that can be hooked up to this small pipe, with an opening in it for a compressed-air line. When air is pumped into the oil-tank, it will force the oil through the crankshaft and you can note from the way in which the oil drips from the bearings just which ones are not holding the oil and just which ones do not get enough.

This motor has a full-pressure lubricating system, in which the pump forces oil through drilled passages to the main, connecting rod and camshaft bearings, and since you have apparently checked the oiling system and can find nothing wrong, we will assume that it is o. k. The next thing to assure yourself, outside of the above, is that the rods are straight and parallel with the walls; that there is sufficient clearance in the bearings to accommodate the oil film, and that the crank-pins are perfectly round and true. The usual practice in lubricating systems of this kind, is to allow from between .0015 in. to .002 in. clearance; you might even allow .003 in. clearance on the bearing that is giving you the trouble.

Another possibility is that your oil filter is clogged and prevents proper circulation of the oil. This

can be tested by opening the test cock at the front of the filter when the engine is warm and running. With plenty of fresh oil in the crankcase, the pressure gauge should show about 30 lbs., at an engine speed corresponding to 20 miles per hour. The oil-pressure adjusting screw is located on the left-hand side of the engine and should be so adjusted that the proper pressure shows on the gauge. It is also important to see that the oil you are using is not too heavy.

Be Careful with This Flame

Question: *We have had considerable trouble with grease getting on the brakes of a GMC T-40 truck having Bendix Brakes. We have tried washing off the lining with gasoline, but this does not help much. We have just put new grease retainers in the rear axle and have thoroughly cleaned the grease from all fittings. Can you suggest any other way in which the brake lining might be cleaned, as it is hardly worn and we do not feel like replacing the lining, at the present time?—E. T. S., Brooklyn, N. Y.*

Answer: Several fleet service stations have found it practical to "burn-off" accumulations of grease from brake linings with the flame of an acetylene torch or an ordinary gasoline torch. If you try this method you will find that an evenly timed passage of the flame will quickly remove grease and dirt from the shoe and lining. After the grease is thus burned, the usual procedure is a brisk brushing with a stiff wire brush, to remove the burned residue.

This entire operation takes but a few minutes, and if carefully done, will not harm the metal of the shoe or the band in any way. It is advisable, however, to use extreme care when performing this operation on woven lining, so that the lining itself will not be injured by the flame.

We believe you are on the right track in eliminating the causes that are responsible for the grease getting on the lining. You have put new retainers in the rear axle and we would suggest that when the front axle is lubricated, that too much grease is not used.

Wants Description of "No-Back"

Question: Can you give me a detailed description or drawing of the new device being used on Stutz cars that prevents them from rolling backwards down a hill? I have heard someone say that this equipment is called the "No-Back." What do you know about it?—L. C. Bronx, New York City.

Answer: This device is called the "No-Back." You were informed correctly. We are publishing a rough sketch of it herewith. By referring to the sectional drawing, the construction and operation of the device can be easily understood. The roller container is held out of contact with the locking-hub A during forward rotation, by the pressure of spring C. The locking roller D revolves, because of its contact with the locking hub, but it is under no pressure and it is well lubricated and noiseless.

Locking-shoe F normally is held in the position shown except when the gearshift lever is in reverse position. Positive locking is secured because of proper angles and the position of the locking roller in re-

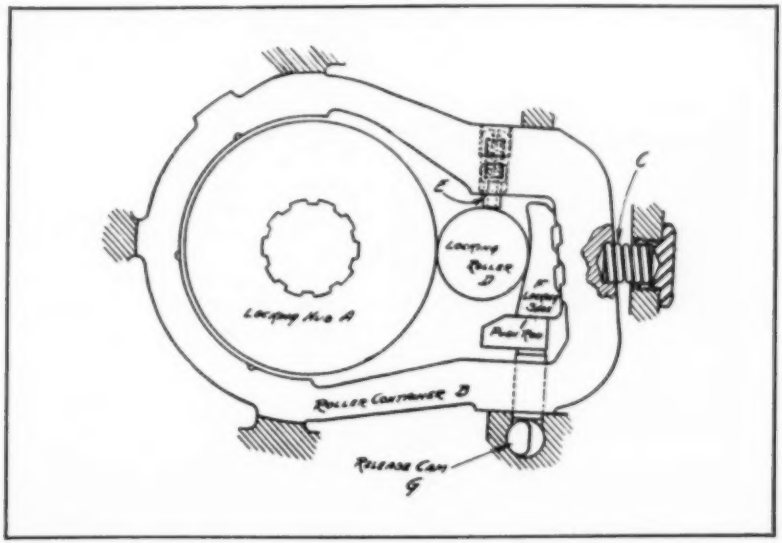
lation to the part with which it is in contact. Function of the locking-roller D and locking-shoe F is to force roller container B into braking contact against locking-hub A thus holding the hub from backward rotation. The locking or braking action is self-centering and imposes no strain on the shaft carrying the hub or on its bearings.

In forward operation, the rotation of the locking-hub tends to take the locking-roller out of contact with locking-shoe F and eliminates any possibility of locking operation.

Release is secured when shifting into reverse from a locking position without forward motion of the car, by lowering the push-rod I through the action of a release cam G and a rack-and-pinion that is operated by the gearshift lever. This allows locking-shoe F to fall away from locking-roller D, releasing the brake.

If the car is running backward with the reverse gear engaged, shifting to neutral or a forward speed does not cause engagement of the roller while the car is coasting backward. This provision prevents any dangerous shock to the power-transmitting elements. As soon as the shaft has made one-quarter turn forward, however, the reverse brake comes into automatic action again.

When the reverse brake is engaged, the clearance shown at the left between locking-hub A and roller container B is taken up by a shifting of the latter to the right causing braking contact between the hub and the container. It is this and the braking action rather than the direct locking action of the roller that holds the car from backing.



Does Not Use Wooden Bearings

Question: I am employed by the Kansas State Highway Commission and the question has been discussed at different times as to the material used in the main and connecting rod bearings of the Rolls-Royce motor. Some say these bearings are made of seasoned wood, some die-cast, and others bronze-back. Please write me the correct information.—J. G. M., Garden City, Kans.

Answer: We always thought that Rolls-Royce used bronze-backed babbitt bearings of the interchangeable type and to make sure, we telephoned their maintenance department in this city. We were informed that Rolls-Royce never used any other bearing material than bronze-backed babbitt. They were just as surprised as we were to hear of seasoned wood, etc., which is of course incorrect. The bearings used are of the replaceable type, similar to those used in American cars.

Timing a Dictator Six

Question: Please forward me information on how to time valves and ignition on a Studebaker 1927 Dictator Six; also timing gear settings for changing the timing chain. —N. J. E., Pittsburgh, Pa.

Answer: The ignition timing of the Studebaker Dictator 1927 is .022 in. piston travel *before* top dead center with the spark lever in the fully advanced position.

To retime the valves and apply a new timing chain, it is necessary to remove the radiator, the timing case cover and the old chain. Set the intake tappet with .005 in. clearance and then turn camshaft sprocket until the intake valve is just tight and ready to open. Next turn the crankshaft until the piston reaches top dead center on the same cylinder and stop it at .008 in. on the way down, or *after* top dead center. With both shafts in this position the timing chain can be applied and your job will be in time. The firing order is 1-4-2-6-3-5. Breaker point setting should be .022 in.

Brake Recommendation Book

IN response to the demand for a book that tells exactly the right type of brake lining suitable for each particular make of car, truck or bus, The Raybestos Division of Raybestos-Manhattan, Inc., Bridgeport, Conn., have recently prepared one that is free for the asking.

This book gives the correct recommendations of the various types of lining to be used for the different types of brakes for practically all the automobiles on the road at the present time. According to the Company, Raybestos Engineers have worked hand-in-hand with the various brake manufacturers and the result is this concise and helpful booklet.

For your free copy, address The Raybestos Division at Bridgeport, Conn., mentioning this publication. The Editor will get you one, if you prefer.

Spark Plug Chart Offered

A NEW spark plug chart has just been issued by AC Spark Plug Company, Flint, Mich. This gives complete spark plug specifications for all cars, trucks, busses and marine engines and tells why only the *proper* plug should be used for each engine. Free copies on request to the Company or the Editor of this publication.

Thanks, Mr. Miller

To the Editor: In looking over the January issue of your valuable magazine, I noticed on page 51 a question under the heading "Vacuum Tank Goes Dry."

Thinking I may be of help in assisting the man who had this trouble, I am writing you this letter. I had the same trouble about a year ago. The motors of our White busses would spit on a long pull until the vacuum tanks had run dry. I found that we were not giving the valves enough clearance for proper functioning.

We would set our valves at .008" and .010" hot, or at least with a shop run, and when the motors were put to heavy work on the road, the excessive heat would cause the valves to "float" or the stems to expand to a greater length and not permit the valves to seat properly; hence floating or riding valves.

If everything has been checked over as this party says it has, and is found o. k., I would suggest that he then give his valves plenty of clearance and he will overcome his trouble without the use of a fuel pump. I trust that this will help out the party who has had the above trouble.—*J. B. Miller, Teche Transfer Co., Lafayette, La.*

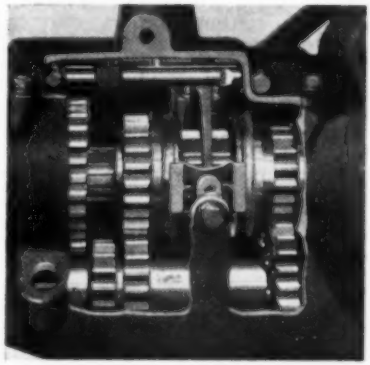
"Syncro-Mesh" Transmission

Question: On the new Cadillacs I note that they have a new-transmission called the Syncro-Mesh. Just what does this expression mean? Can you print a picture of it?—A. J., New York, N. Y.

Answer: Syncro-Mesh is the term applied to the new Cadillac transmission which denotes that the gears before being meshed are automatically synchronized. A portion of the transmission showing how cone clutches are used to equalize the rotating speeds of the gears, is printed here.

When a change is made from low to second, second to high or from high to second, this device causes the two spinning members which are about to mesh, to revolve at the same speed. Thus, shifting is effected without clashing.

This synchronizing effect is brought about by a pair of simple cone clutches which are actuated by the transmission control lever through a cam mechanism. As the control lever leaves the neutral position and is moved toward second or high, it engages one or the other of the cone clutches just long enough to synchronize the two members so that when the control lever is moved further, the teeth which interlock to take the drive are turning at the same rate of speed. The gear shifting positions are conventional.



Cutaway view of the syncro-mesh portion of the Cadillac transmission as described above.

What You

New Products of Interest

Speed Gears for Ford Model A

DOUBLE-DIAMOND mated drive and pinion gears for Model A Ford are made in a special speed ratio of 3 3/11 to 1, as well as in the standard 3 7/9 to 1 ratio.

In addition to giving the Model A Ford a higher top speed, the installation of these speed ratio gears is said to bring about a very noticeable reduction in the vibration of the car, particularly at average driving speeds.

With these special gears, motor speeds are lower for any given road speed, and a worthwhile saving in gasoline consumption is effected, according to the makers.

The gears are machine-mated on Gleason testing machines, both for quietness and perfect tooth contact. They are then tagged with the correct setting as shown by this test, to insure proper installation and adjustment. The gears are made from upset forgings of 3½ per cent nickel steel, and copper plated blanks. The pinion is burnished.

Write to Automotive Gear Works, Richmond, Ind., for free catalog; also for copy of "Modern Methods of Drive Gear Installation." The latter is a book that every fleet man should have. Free for the asking.

Rajah Terminal Tool

SOMETHING new in a hand tool to permanently attach terminals to ignition cable without solder, is offered by The Rajah Company, Bloomfield, N. J., makers of the well-known "Rajah" spark plugs, terminals and other products.

But three simple operations are necessary —the cutter on the end of the tool removes sufficient insulation and the exposed wire strand is then bent over. The terminal is next applied and a slight squeeze on the handle crimps it permanently in place.

The Rajah terminal tool is sold with a box of assorted terminals and this outfit, together with a roll of good ignition cable enables the fleet repairman to immediately "manufacture" a set of new cables for any engine, without the necessity of a large stock.

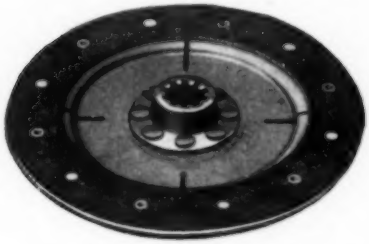
According to the Rajah Company, fleet owners who have stocked this item are enthusiastic over it. Circular and catalog on request, without obligation.

U WANT to KNOW

Aztec Clutch Plates

ANNOUNCEMENT has just been made by Asbestos Textile Company, 475 Fifth Avenue, New York City, of a complete line of clutch plates bearing the well-known AZTEC trade-mark, to be distributed through the automotive jobbers.

The company, basic manufacturers of asbestos products, including brake lining and automotive clutch facings, states that their newest service to the fleet operator includes



the complete plates, with quality linings riveted to the same. This service will enable a great saving of time and will insure better work being turned out in repairing clutch plates on all automotive vehicles. Only the best quality of both plates and facings will be used, it is pointed out.

Readers of this publication are invited to write for a free copy of a catalog covering the new line. The Editor will get this for you if you prefer, or, ask your jobber.

Super-Drainoil Piston Ring

THE latest product of The Piston Ring Company, Muskegon, Mich., is a new ring called "Super-Drainoil" and illustrated herewith.

The new ring has been designed to meet the demand for an oil ring which will function efficiently in present-day high-speed motors and also at lower speeds.

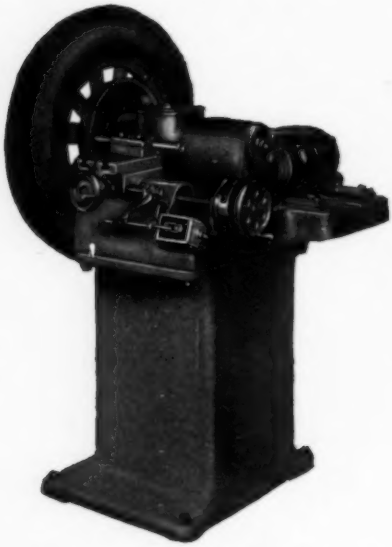
In Super-Drainoil the up-slanting slot principle is combined with individual oil reservoirs in the face of the ring. The narrow lands on the periphery of the ring more easily penetrate the film of oil and scrape the excess oil off the cylinder wall into the reservoirs, according to the makers.

Each relief slot has its own reservoir and there is *no* continuous groove, as each partition or bridge forming the ends of the reservoirs has full wall contact, preventing the passage of oil except through the slot.

The manufacturers will be glad to send further information on request. A complete piston ring size book is also available. The Editor will secure these for you, or you can write to the company mentioned above.

Raybestos Super-Drum Lathe

A NEW brake-drum lathe has recently been placed on the market by The Raybestos Division of Raybestos-Manhattan, Inc., Bridgeport, Conn. It is called the Super-Drum Lathe and is pictured below in one of its forms, although available in several models.



The new lathe is driven by a ¾ h. p. motor, through rubber driving belt and worm-gearing, providing three speeds. The higher speeds are for small drums: intermediate for ordinary size drums and slow speeds for large drums, those high in carbon or made of "gun-iron."

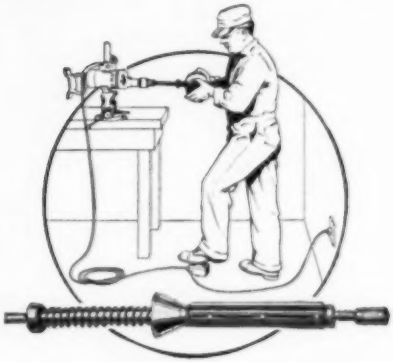
Some of the features as pointed out by the makers are: control switch with adjustable stop; ratchet feed with hardened parts; five feeds, including .003, .006, .009, .012, .015; removable cover for inspection and lubrication of gears; rigid base and column; maximum feed of 9 inches.

A circular has just been issued that describes and prices the various models of the new lathe. Another book, "Brake Lining Replacement Specifications," tells the right lining to use for all cars. Both sent free on request to the Editor or the Company.

Piston Pin Hole Grinder

THE No. 2 Piston Pin Hole Grinder is announced by the Automotive Maintenance Machinery Company, 816 West Washington Blvd., Chicago, Illinois. The new grinder meets the demand for a larger tool.

The new No. 2 tool handles requirements of all large passenger car, truck, tractor, and other heavy duty work. Standard range is from 1 inch to 1⅝ inches. Extra oversize abrasive carriers extend the



range to 1 15-16 inches. A pressure spring on the shank forces the centering pilot into the piston pin hole when grinding bosses separately and automatically maintains the

bosses in perfect alignment.

A special foot switch is furnished with the grinder. For heavy work, the drill must be under control at all times. A touch of the foot stops and starts the drill and leaves both hands free to hold and handle large pistons.

Battery Cable Assortment

A NEW "Midget" battery cable assortment of 24 popular cables—nine numbers—is announced by the Belden Mfg. Co., 4685 W. Van Buren St., Chicago, Ill.

This assortment is known as No. 1850 and lists at $12.40, subject to the usual discount. It is made especially for the fleet service station, requiring a small outlay and being an assortment that has been carefully selected to service over 90 per cent of all battery cable jobs.

A metal rack is included free with the assortment, which can be hung in a limited space on any wall. Readers of this publication are invited to send for particulars; also for a free sample of "Beldenlac" gnition cable for test purposes.

Wireless Dome Light

A NEW type of dome light is announced by Delta Electric Company, Marion, Ind., illustrated herewith. It is entirely self-contained and has no connecting wires inasmuch as it utilizes two small flashlight batteries. It is called the "Wireless Domelite."

This light is designed particularly for use on Model A Fords and other cars not originally equipped with dome lights. It can also be used to provide light for rumble seats and luggage compartments of passenger cars and also for truck and van cabs or bodies. The light produced is

equal to that of any dome light, according to the manufacturers.

The dome light is finished in blending enamel and velvet nickel trim. It is equipped with self-contained slide switch and No. 14 Mazda bulb. The list price complete is $1.50 less batteries.

Free Safety Glass Literature

SOME interesting literature is offered to our readers by Protex Glass Company, 220 Fifth Avenue, New York City.

The manufacturers point out that Protex glass, although solid plate, cannot fly. In case of severe accident and the glass cracks, fine nichrome wires will hold the pieces safely in the frame. Blind driving in bad weather is also eliminated by connecting these fine nichrome wires to the vehicle's storage battery, heating the glass sufficiently to prevent sleet, snow or ice from adhering to it.

Descriptive literature will be sent free on request to the Company. The Editor will get this for you, if you prefer.

Lee M. Clegg Appointed

LEE M. CLEGG has been appointed vice-president in charge of sales for Thompson Products, Inc., it has been announced recently. Mr. Clegg's promotion comes as part of a move on the part of the corporation to participate fully in the "return of business." His new duties will consist of planning and supervising sales contacts.

Perfect Circle Sales Increase

THE production schedule of the Perfect Circle Company has been increased 100 per cent during the first two weeks of February, according to a recent announcement. Replacement sales for January showed an increase of 52 per cent over the same month last year, the report further pointed out. Total sales in January were 10 per cent greater than January, 1930.

Fleet Man Available

TRANSPORTATION Engineer, with fifteen years' experience in design of special motor vehicles, operation and maintenance of motor trucks and busses, is now available and desires connection with fleet owner, either transportation company or public utility.

Am a technical graduate with ten years' executive experience; ability to organize and supervise maintenance system; handle personnel; promote safety programs; design special bodies and equipment; and operate fleet at minimum cost.

Would prefer to locate in East, desiring a position that will be permanent and with opportunity for advancement. Address communications to Editor, The Fleet Owner, 90 West St., New York City. All replies will be held in strict confidence.

Bear Reports Good Business

A HEALTHY report for 1930 was made by Bear Mfg. Co., Rock Island, Ill., whose volume of business during that year exceeded 1929's figures by 30 per cent. The increased popularity of wheel and axle aligning equipment, and the recognized *necessity* for it, was responsible to a great extent for this increase, according to company officials.

Wohlhuter B-N Secretary

C. F. WOHLHUTER was elected a director and secretary of the Burgess-Norton Mfg. Co., Geneva, Ill., at the annual stockholders and board of directors meeting held recently. He succeeds Mr. W. D. Smith, who resigned in December.

Automatic Spark Control

(Continued from page 42)

to overcome this is to increase the spring tension. When this is done, the low speed operation of the governor is affected. If the governor does not expand at low engine speeds, the spring tension can be decreased, but in this case the governor will throw out and advance too fast in relation to the engine speed.

By the foregoing explanation, it will be seen that when a car is equipped with a governor which has no means of adjustment, other than increasing or decreasing spring tension, it is impossible to get the proper performance out of the engine by simply adjusting the timing through shifting the distributor or cam.

If actual tests were made, that is, as to power, speed and gas consumption, it would be found that a large percentage of the engines now in service will show a great improvement if the governors in the distributors with which they were equipped could be adjusted to produce the proper advance curve, which is not the case.

It has been found that in many cases where the engines were of the same make and model, the same advance curve was not entirely satisfactory. There may be a variation in compression which requires a different spark timing. In many cases where carburetors or manifolds are changed on an engine, the compression may be raised or lowered. This is due to the passageway of the new carburetor or manifold being of lower or higher resistance than the old carburetor. One engine may be operating in a low altitude and one in a higher altitude, which would require different spark timing. In practice, manufacturers of engines specify a certain advance curve, but, after the engine is in service for a while, the governor springs weaken, which permits too much advance, or the moving parts of the governor become worn, which will cause too much advance. In some cases governors actually stick, due to friction, which prevents them from advancing the spark far enough. Oftentimes, where the cylinders are rebored, the compression is raised, or a fleet owner may intentionally have the compression raised in the engine. These conditions, under which engines operate in the field, are different than when being tested on a dynamometer in the factory.

Making the Wrecker Pay

(Continued from page 22)

However the idea might profitably be applied by even the small fleet operator who has heretofore forsaken the idea of having his own wrecking car because the amount of towing he did would scarcely warrant the investment. However, by making the wrecker do "double-duty" as this Chicago firm has done, the "white elephant" in the form of a large investment for a limited amount of work, ceases to exist as a liability, but becomes a profitable asset. Should any further information be desired as to the particular make of derrick and trailer hook-up used, the Editor of this publication will be pleased to send full information on request, without obligation.

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The New Willys Trucks

(Continued from page 52)

versible type, with 17-inch diameter, rubber-covered, steel wheel. Timken roller bearings are used throughout both front and rear axles. The entire line has "finger-tip" control for operating starting, lighting and horn. Electrical system includes starter and generator in combination with a 6-volt battery operated ignition system. Frames are of the double-drop type and are provided with ample cross-members.

The closed cab pick-up body is mounted on the 113-inch wheelbase. It is made of welded steel and has dimensions of 66 inches long and 45 inches wide. The driver's compartment is of the coupe type. The de luxe sedan delivery body is a companion to the pick-up, mounted on the same chassis and having a height of 47 inches, a width of 48¼ inches at the floor and 54 inches at the belt line. This unit has double rear doors with large windows.

The dump body is mounted on the 131-inch wheelbase chassis, and is equipped with hand, gravity, mechanical power and hydraulic hoists. The body is of 10-gauge steel, electrically welded. The 1½-ton chassis with the stake body has a completely ironed floor, with double side rails to hold the stakes rigidly upright. Its inside measurements are 108 inches long and 79 inches wide.

An interesting booklet has just been issued, that completely illustrates and describes every detail of this new line of six-cylinder trucks. Interested fleet owners can get a copy of this by writing directly to Willys-Overland, Inc., Toledo, Ohio. The Editor will get this for you, if you prefer.

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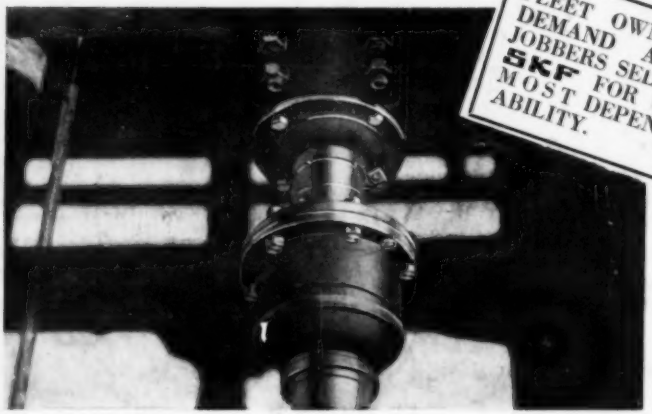

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